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PART I.

Original Contributions.

ON THE OPERATION OF ABSCISSION IN STAPHYLOMA.

By Mr. CRITCHETT.

My principal object in the present paper is to describe a method of operating for staphyloma that I have adopted during the last two years in several cases, and that seems to possess some advantages over the various plans that have been hitherto recommended.

In the present day the word staphyloma has assumed a wide significance; it embraces every case in which the tunics of the eye at any point, under any circumstances, and from any cause, lose some portion of their resisting power, and yield either to the normal or abnormal pressure of the fluid contents of the eye. Thus myopia is now shown to depend in many cases, and in severe forms, upon a yielding and giving way of the posterior part of the sclerotic, or in other words upon a posterior staphyloma, in like manner,

that change so serious in its effects upon vision, known as "conical cornea," is in fact an anterior transparent staphyloma, depending upon the gradual thinning of the cornea, and yielding to the pressure within. This has been demonstrated in some interesting and important researches, upon the morbid anatomy of "conical cornea," published by Mr. Hulke in this journal. (See No. 3 page 338.) Or again, the cornea may be weakened by protracted inflammation of its tissue, as in some severe forms of keratitis, the result of inherited syphilis; and also in some severe forms of pannus, or vascular opacity of the cornea. In such cases the cornea loses some of its natural powers of resistance and yields, but the cornea increases uniformly, it does not mount up into a cone. The softening of structure is uniform, and therefore the bulging is of the same character.

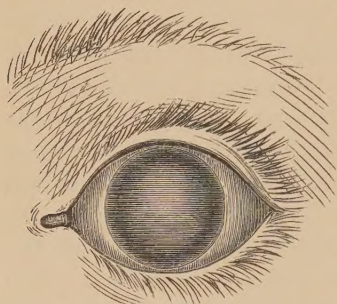
Or, again, a portion of the cornea may be destroyed by a penetrating ulcer, or by sloughing, or by injury. This will be replaced by a tissue less firm and resistant, which will gradually yield to the pressure within, giving rise to a partial staphyloma of the cornea, which has a tendency to gradual increase, and by degrees will implicate the healthy part of the cornea and the iris in its change of form, and thus materially injure and ultimately destroy vision. Or again, we may have partial staphyloma of the sclerotic, anterior or lateral, or posterior, the result of limited or circumscribed inflammation of the region, involving the choroid and sclerotic, and producing thinning, softening, and bulging of the latter. This not unfrequently occurs in the ciliary region, producing little dark coloured bulgings; or, in more severe forms, the whole of the anterior part of the eye seems to be lifted forwards. This may occur with but slight implication of the posterior part of the eye, and without any damage to the transparent media. We also find partial staphylomas in other parts of the sclerotic, laterally or posteriorly. This condition almost invariably indicates and results from serious mischief, involving the choroid and retina. For these various conditions, and more especially those in which the eye still retains to a

greater or less degree its functions as an organ of vision, the operation I am about to describe is obviously unsuited. I merely mention them in this place as interesting and important varieties of staphyloma. I do not propose to enter into the question of the treatment suitable for them. I would merely remark in passing, that inasmuch as we have no means of strengthening the soft, weak, bulging wall or encasement, the only chance of restoring the balance between the containing and the contained, between the tunics and humours of the eye, is to diminish if possible the pressure from within, to soften the globe by lessening the amount of its contents, and of its powers of secretion. This may frequently, indeed almost always, be accomplished by the operation of iridectomy. It has a remarkable effect in arresting the progress of a partial staphyloma, and has thus added another to the wide range of important and formidable diseases for which this operation offers the only rational and effective treatment, and another laurel to the many enjoyed by its distinguished author Von Graëfe.

The cases to which I am more especially anxious to direct attention in this paper are those to which the term of staphyloma has been more commonly applied, and in which the entire globe of the eye may be said to be implicated to a greater or less extent. Usually all perception of light is lost. Even where this remains, all possibility of recovering the slightest useful vision is gone.

The size, appearance, pathological conditions, and causes, are exceedingly varied. Perhaps scarcely any two cases are perfectly alike. Sometimes the morbid change is limited to the cornea, which having been destroyed either by ulceration or sloughing, its place is supplied by a membrane, which somewhat resembles that tissue in its appearance, and which, possessing a less degree of resistance, gradually gives way to the pressure from within, and bulges and enlarges. Sometimes it presents a dense white mass, which rises into a prominent conspicuous conical projection, the apex of which is not unfrequently thin and semi-transparent, as if an abortive

and imperfect effort had been made by nature to form something resembling a pupil. Sometimes it forms a more uni-



formly round or globular prominence. Sometimes these projections attain a considerable thickness, probably an effort of nature to re-establish the balance between the internal pressure and the external resistance; as I have before suggested, this tissue is found on examination to be made up of an interlaced fibrous struc-

ture, without any trace of true cornea. This is, however, by no means invariably the case. I have met with cases in which a central penetrating ulcer of the cornea (particularly in infants, and as the result of purulent ophthalmia), has been followed by a large staphyloma, a considerable portion of which was made up of true cornea. In many of these cases the projection is limited to the area of the cornea, and does not involve the rest of the globe, which preserves its normal size and tension. The iris is often blended with its posterior surface, and the lens is in contact with it also. Or again, I have found a considerable quantity of aqueous fluid filling up the interior of the staphylomatous projection. These various forms, having attained a certain size, will remain stationary, others will manifest a tendency to increase. They are invariably the result of disease limited to the anterior part of the eye—the cornea, iris, and lens—not involving the ciliary region. When, however, the anterior or corneal staphyloma has attained considerable size, I have observed that the sclerotic region will likewise expand, and seem to become secondarily involved in the hypertrophy. Instead of the dense white opaque form of anterior staphyloma, it sometimes presents a dark blue or black appearance. It covers a larger area, is more perfectly round and expanded, and is softer and thinner than the previous form. It has a

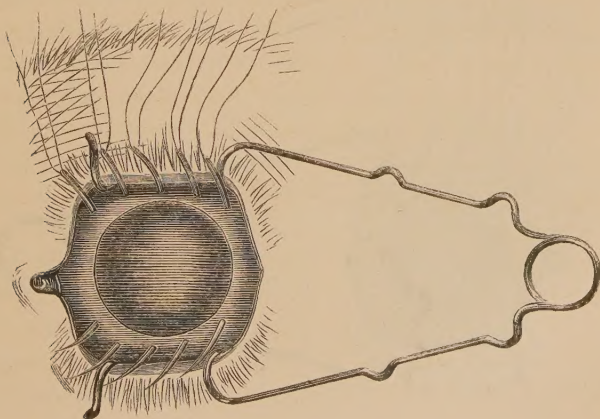
tendency to almost indefinite, though gradual enlargement. In other cases we find the tendency to staphyloma limited to the ciliary region. The cornea, iris, and lens are thus advanced to a considerable extent, without producing any marked change in these structures, but only a very decided increase in the antero-posterior measurements. This is possible to a very considerable degree without any serious or extensive impairment of vision, although in many such cases there is closed pupil and capsular cataract, &c. In another and a large group of cases, the entire globe of the eye is implicated in the enlargement. There may be a uniform enlargement of the entire tunics, both anterior and posterior, or there may be a general enlargement, with irregular bulgings in various parts. In this way a staphyloma sometimes attains a very considerable size, in certain parts it becomes exceedingly thin, and in some instances it suppurates, and breaks like an abscess. In others it may give way and evacuate its aqueous contents; or, having attained a certain size, it may remain stationary. In considering the question of operating, there is an important distinction to be made between those cases where the disease is chiefly limited to the anterior part of the eye, and those in which it has originated in the posterior part and in the deep textures. In the latter the vessels are often enlarged and weakened, and prone to give way when support is taken from them, producing protracted hemorrhage.

It will be generally admitted that in all cases of complete staphyloma, some operative proceeding is called for. The deformity is usually considerable, and is liable to increase; the part is in a morbid condition, often inflamed and irritable, and exerting an unfavourable influence upon the other eye. Whether it remain in a quiet state, or pass through a series of changes, it becomes desirable to operate. We may now consider what are the conditions that we wish to bring about by the operation.

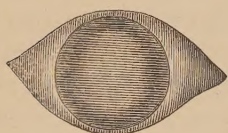
The object we have in view is to reduce the staphyloma to a firm elastic bulb, that shall be fully influenced by the

various muscles, and shall be about a third. less in size, or at any rate, in its antero-posterior measurement, than the normal eye, this condition being the most favourable for the employment of an artificial eye. Various methods have been employed with a view to obtain this result, that which has been most commonly employed up to the present time both in this country and on the Continent, has been to cut away the anterior part of the staphyloma with an ordinary Beer's knife, so as to open into the vitreous chamber. Some slight modifications have been introduced by various operators, some removing only a small portion, others taking away the anterior third, or even half of the staphyloma. Some have introduced a needle previously, so as to allow some of the contents of the globe to escape previous to abscission. Those who have had an opportunity of extensively testing this method of proceeding, have become aware of several serious inconveniences. It not unfrequently happens, that a gush of vitreous humour follows the removal of the anterior supports, and subsequently the enlarged and diseased vessels give way, and continue to bleed for several hours, distending the surrounding parts, causing considerable pain, and ultimately suppuration. This untoward result may follow immediately upon the operation, or a few hours or even days after, or in cases where hemorrhage does not occur, suppuration may occur attended with considerable reaction, and constitutional disturbance. Under either of these contingencies, the globe is apt to shrivel up into a small compass, with very slight movement, and imperfect adaptation for an artificial eye. This shrunken globe occasionally becomes hard and painful, and irritates the companion eye. In other cases where no hemorrhage occurs, and no suppuration follows, the sclerotic opening remains in a patent state, with the vitreous humour or the lens presented. Repair, is, under these circumstances, difficult, tedious, and uncertain. The membrane that is formed is not unfrequently elastic, and by yielding to the pressure within, bulges, and constitutes a fresh staphyloma, or forms an unstable and irritable basis

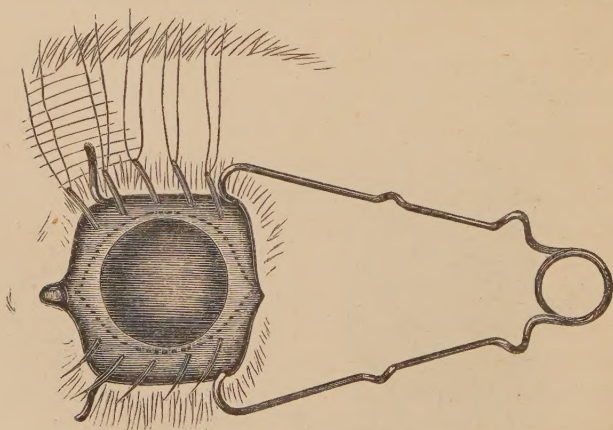
whereon to rest an artificial eye. Such are the objections to the methods of operating ordinarily employed for the reduction of a staphyloma, and they lead us in the next place to the consideration of the results we are desirous of obtaining, of the accidents we wish to avoid, and the method proposed for their avoidance. In reducing a staphyloma, the aim and object is to form a dense, fibrous, elastic, movable bulb, filled with fluid, flattened upon its anterior surface, and of such a size as admits the ready adjustment of an artificial eye, and its free movement. In carrying out this object, it is important to mark the size and form of the piece to be removed, to allow of some slight escape of the contents of the eye, so as to avoid a sudden gush, to keep up some support during the operation, and subsequently to place the parts in a favourable condition for supporting the vessels, keeping up pressure, and uniting by the first intention. I will now endeavour to describe the method by which these various objects are intended to be carried out. The patient being placed under the influence of chloroform, the staphyloma is freely exposed by means of a wire speculum, a series of four or five rather small needles, with a semi-circular curve, are passed through the mass about equi-distant from each other, and at such points as the lines of incisions are intended to traverse. These needles are left in this position with both



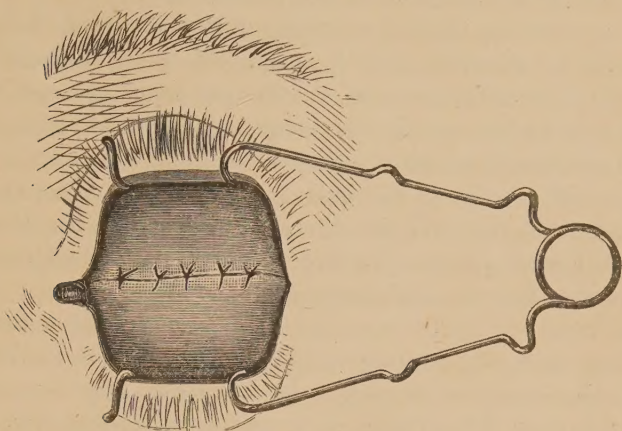
extremities protruding, to an equal extent, from the staphyloma. The advantages gained by this part of the proceeding are:—1st, that a small quantity of the fluid parts of the distended globe escapes, thus diminishing pressure, and preventing a sudden gush of the contents when the anterior part is removed. 2ndly, that the points of emergence indicate the lines of incision. 3rdly, that the presence of the needles prevents, or rather restrains, to some extent, the escape of the lens and vitreous humour, after the anterior part of the staphyloma has been removed. The next stage of the proceeding is to remove the anterior part of the staphyloma. This requires some judgment and modification in size and form, in accordance with the extent of the enlargement, so as to leave a convenient bulb. My usual plan is to make an opening in the sclerotic, about two lines in



extent, just anterior to the tendinous insertion of the external rectus muscle with a Beer's knife. Into this opening I insert a pair of small probe-pointed scissors, and cut out an elliptical piece, just within the points where the needles have entered and emerged. The needles, armed with fine black silk, are then drawn through each in its turn, and the

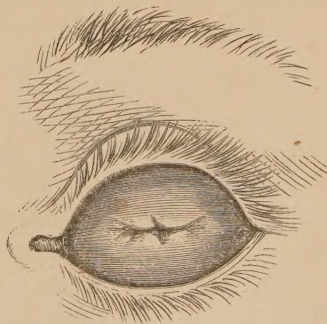


sutures are carefully tied so as to approximate as closely as possible the divided edges of the sclerotic and conjunctiva.



The operation is now finished; the speculum may be removed so as to allow the lids to close, and wet lint may be applied to keep the parts cool. In a large majority of cases, union of the divided edges takes place by the first intention. The operation has been performed by myself and by my colleagues at Moorfields Hospital, in about thirty cases, and suppuration only occurred in four cases. I generally leave the sutures in for some weeks.

Sometimes they come away spontaneously, and when that is not the case, they may readily be removed after all irritation has passed away, and after firm union has taken place. If the case be examined three or four months after the operation, a moveable bulb is seen with a flattened anterior surface, traversed by a transverse white line of cicatrix, and having rather a prominent



external angle. Upon this an artificial eye can be readily adapted, which moves to a greater extent than I have observed previous to the adoption of my present plan.

In reviewing the various stages of this operation, I think it will be admitted that it accomplishes the objects for which it is undertaken in a safe and rapid manner, and avoids to a great extent the inconveniences that attend the methods usually adopted. Hemorrhage and suppuration are prevented, the size of the bulb is regulated by the union of its edges by the first intention, and a firm, elastic, fibrous case is formed, possessed of extensive mobility, and admirably adapted to bear an artificial eye.

I have not quoted separate cases, because the merits of such an operation can only be fairly judged by the results of numerous experiments, and, as far as my own experience has hitherto gone, I have been more and more confirmed in the favourable impression I have formed, and I can confidently recommend it to the profession as worthy of trial.

OBSERVATIONS ON DEFECTS OF SIGHT IN BRAIN DISEASE.

By J. HUGHLINGS JACKSON, M.D., M.R.C.P.,

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I WISH to say, first of all, that in writing this paper, I write as a physician, and not as an ophthalmologist. I have studied ophthalmic medicine merely as a help to the study of diseases of the Nervous System. I look at the fundus of the eye, in cerebral cases, when there is even slight failure of sight, in order to ascertain the calibre of the retinal vessels, and the supply of blood to the optic discs, as evidenced by their greater or less coloration. For instance, after a fit of epilepsy, there is often severe headache attended by giddiness, singing in the ears, and other symptoms referrible to disorder of the circulation, and, generally, trifling

defect of sight. I trust that by a careful study of the circulation, both venous and arterial, in the eye, in cases like this, I may learn something as to the condition of the circulation of the brain itself in cerebral disease.

The above is put forward as some excuse for my venturing to address ophthalmologists on subjects on which they must necessarily have had more special experience than I have.

I intend chiefly to give a few particulars as to the causation of amaurosis in cases of tumours of the brain. The cases have already appeared in the *Medical Times and Gazette* for August 30, 1862. I then reported, from various hospitals, cases of diseases of the cerebellum, in many of which there was blindness.

Blindness not uncommonly occurs in cases of tumour of the brain. Sometimes the optic nerves are compressed, and here the blindness is easily accounted for. Sometimes also one optic nerve only, on the cerebral side of the commissure, is affected, and then we get half-blindness of each eye. In many cases, however, it is somewhat difficult to account for the production of the amaurosis. In the *Medical Times and Gazette* for January 25, 1862, is recorded a case of echinococcus in one hemisphere of the brain. The patient, a girl, thirteen years of age, was in St. Thomas's Hospital, under the care of Dr. Risdon Bennett. In the report of the case, it is stated that she could neither walk nor stand, but that "when lying in bed, she could move the legs freely." There was no loss of sensation anywhere. There was complete blindness, and by the ophthalmoscope, the optic discs were seen to be white and atrophied. There was pain also, mostly at the vertex; but, at the first, the pain was at the occiput, where she had had a blow. Tumour of the brain was diagnosed, and "from the peculiar impairment of locomotive power, it was thought probable that the tumour was in the cerebellum." She had also epileptiform seizures. This case, during life, was certainly very like many cases of disease of the cerebellum, and yet at the autopsy, the cerebellum was quite healthy, and the optic tracts were, to the naked eye, quite unaltered.

The blindness in cases of tumour of the brain, not directly affecting the optic tracts, may be produced by the general pressure, or by reflex irritation, or because, in some way, the tumour interferes mechanically with the blood-vessels, so that parts at a distance do not receive their due supply of blood. It may be that the nutrition of the optic tract is interfered with because the nerves supplying its blood-vessels arise or pass in the parts injured.

In the case of echinococcus, just related, and also in a case (under the care of Dr. Gull, in Guy's Hospital), of cancerous tumour of the cerebellum pressing on the corpora quadrigemina, the optic discs were found, on ophthalmoscopic examination to be quite white (white atrophy), the rest of the fundus being healthy. This condition of the optic discs is what is found in nearly all cases of amaurosis in cerebral disease. In some, however, there appears to be not so much a defect of circulation, as an obstruction, the optic papillæ being swollen, ill-defined, and blood being diffused near them, or in other parts of the fundus, as if the vessels had burst from over-distension. A well-marked case of this kind was shown to me by Mr. Bader. He considered that there was probably a tumour of the brain, and that, by pressure, it mechanically obstructed the circulation.

In the ordinary white atrophy, the atrophy may be due to some eccentric irritation contracting the blood-vessels, and thus diminishing the supply of blood; so that wasting of the nerve follows, as wasting of the muscles does in infantile paralysis, which, also, is generally supposed to be due to some eccentric irritation contracting the vessels. The fact that sometimes, though in few cases, and then only at the beginning of the disease, the sight varies remarkably, tends to favour this idea; but at the same time it is well known that in *organic* disease of the brain, intermission of symptoms is not very uncommon. It may be that it is an instance of atrophy of the nerve following loss of its function, just as it atrophies when the eyeball is lost. In the case of

amaurosis above-mentioned, in which there was supposed to be mechanical obstruction to the vessels, the optic discs became after a time quite white, although their edges were ill-defined, and there were still remains of the apoplectic effusions.

That amaurosis does often occur in connexion with disease of the cerebellum, and also with disease of the spinal cord, has long been noticed. To explain how it occurs is not easy. It seems certain that the cerebellum is not the origin of the optic nerve fibres, as in Combette's case of congenital absence of the cerebellum (quoted by Mr. Solly in his work on the Brain), all the senses were perfect. "The child could see, hear, and taste in a perfect manner."

Dr. Brown-Séquard thinks that the defect of sight "is a result of an irritation of certain parts of the cerebellum acting upon the nutrition of some parts of the nervous apparatus of vision." He says also :—"It is not usually on account of a pressure upon the corpora quadrigemina that amaurosis exists in cases of disease of the cerebellum, as we find that loss of sight is sometimes observed in one eye only, and that is the eye on the side where exists the alteration in the cerebellum; while, if it were owing to a pressure on the tubercula quadrigemina, the loss of sight would be on the opposite side." In those cases of disease of the cerebellum to which I have alluded, in which there was defect of sight, both eyes were affected. In the case of cancer of the cerebellum, no doubt there was, towards the end at all events, some interference with the corpora quadrigemina. The tumour was large, and when the venæ Galeni were pressed on, causing the effusion of serum and the "dropsy" of the brain, the corpora quadrigemina must also have been interfered with. In other cases, as in the case related by Andral (p. 18), and also in cases of amaurosis with paraplegia, pressure could have nothing to do with it.

A remarkable feature, however, in one case was, that the sight varied remarkably. Just as the man had had epilepsy and loss of function of the brain, so we might say he had temporary epilepsy of the retinae (or optic nerves). In epilepsy

the loss of consciousness is believed by Brown-Séquard to be coetaneous with contraction of the blood-vessels of the brain. It is attended by paleness of the face, and probably also, if I may use such expressions, paleness of the retinæ and paleness of the brain. It would be very desirable to examine the retina during a paroxysm of epilepsy. We are not, however, often present when a patient has a fit, or we arrive, as generally happens, just too late, or, when in time, from the struggling of the patient, the examination is impracticable.

In one case, however, a case of "epileptiform convulsions," I had the opportunity of examining the fundus of the eye, if not during a genuine fit, at least during a condition in which the consciousness was lost, and in which the pupils, ordinarily small, were dilated as if under the influence of atropine. The optic discs were extremely pale. Once, the vessels disappeared altogether for an appreciable time. After a while, however, they reappeared, and were found to vary with the respiration. When the patient *in-spired* the vessels disappeared, returning again on expiration, like lines of red ink on white paper. This examination was too hurried, and the results too indefinite, to make it an observation of any great value. The case, too, was not one of genuine epilepsy, but one in which there was cancer of the sphenoid and secondary cancer of the glands in the neck. The fits occurred either as a result of obstructed circulation, or from pressure on the nerves of the neck. It is mentioned here merely to hint that it may be possible to study the cerebral circulation, by examining the vessels in the eye. I intend to examine the fundus of the eye in an epileptic guinea-pig, as a fit can be induced when we are ready for the examination.

In a few cases of epilepsy there is complete blindness for an appreciable time before the paroxysm—the patient is conscious, and yet in total darkness. And I have noticed that, in many cases of convulsions, in which one side of the body, only, is involved, there is temporary failure of sight before the full epileptic paroxysm. Cases in which there is

failure of sight from temporary loss of accommodation are common enough, especially when the eyes are hypermetropic. In these cases the patients say that for a time they "cannot see;" but it is easily ascertainable that they can see, but that they see nothing distinctly—nothing in definition.

A person, whose eyes are hypermetropic, cannot see clearly, in the distance even, unless the ciliary muscle is *acting*. Failing power of this muscle will therefore cause confusion of sight. The patient cannot see well because the rays are not brought to a focus on the retina—the retina itself being sound. Hence defect of sight in hypermetropia is often significant of debility only. It is due, then, in many cases, to the debility so often attending the brain disease, and not directly to a fault of the nervous system. Whilst the patient is in health he can accommodate, in spite of the flatness of his eyeball; but when he gets out of health he is unable to do it. In many cases these distinctions are of consequence in diagnosis, as, of course, it makes a great difference as to the value of the symptom whether the defect of sight be due to disorder of the dioptric apparatus, or to the disease of the retina or optic nerve.

The total blindness preceding the epileptic paroxysm is a different thing; and just as epilepsy is supposed to depend on contraction of the vessels of the brain, so the temporary amaurosis, in these cases, probably depends on contraction of the blood-vessels of the retina—an epilepsy of the retina.

I believe that the following is an instance of epilepsy of the retina. It seems clear that it was not merely failure of accommodation. One morning, Julia W., a middle-aged woman, came to me saying, that for five whole minutes she had been "blind." She was at the time seated peeling potatoes. The blindness came on suddenly and left suddenly. It was not total darkness, but "dark," which was the word she used herself in describing it. It was not from failure of accommodation. I asked her to look through a very strong convex glass. It was not like that, she said. It was not spots, nor specks, nor clouds, nor colours. When I saw her

a minute afterwards, she could read well with each eye, and the fundus of each, as seen by the ophthalmoscope, was normal. She had headache across the forehead, which continued the next day. She said it felt "tight" across the forehead. She had no giddiness. She was regular, but subject to dyspepsia.

In cases in which loss of sight is followed by the epileptic paroxysm, may we not say that the contraction of the blood-vessels has begun in an outpost of the cerebral circulation (the retina being supplied by branches of the same vessels as the brain, these vessels being supplied by the same vasomotor nerves), and that, on extension to the other branches of the carotid, the "brain's blindness," loss of consciousness supervenes? In but one of the cases of disease of the cerebellum, which I have reported, was there any note of temporary intermissions of sight. As a rule, the progress is gradual, and the loss of sight permanent.

To pursue the subject of the cause of reflex amaurosis in these cases, I may mention that it is not unusual, Dr. Brown-Séquard tells me, for guinea-pigs rendered epileptic by section of one lateral half of the spinal cord, to become amaurotic. Whether they are first subject to occasional and temporary loss of sight, it is, of course, impossible to tell. In a case reported in one of the Indian Journals, by Dr. H. V. Carter, in which it was clear, by the symptoms, that a man had, from an accident, suffered an injury similar to that artificially made in the guinea-pigs, there was a transient epileptiform seizure and transient affection of the sight of one eye. Dr. Carter writes:—"One night the patient had a sudden attack of dizziness and confusion, and the head fell towards the left side, and the sight of the eye temporarily failed." But transitory confusion of sight is due now and then to spasmodic affections of the external muscles of the eye. The patient, of course, does not know to what the confusion of sight is due; and when we do not see him during an attack, we can only judge by circumstantial evidence, more or less trustworthy. In a case of syphilitic epilepsy under my care,

the patient was convulsed on the right side of the body. He had convulsions of the face, arm, and leg, and confusion of sight *before* he became insensible. After one of these attacks, the side on which he had been convulsed, became paralysed. The external rectus, as well as the face, arm, and leg, was paralysed. To the convulsive action of this muscle was due, no doubt, the defect of sight preceding the epileptic paroxysms.

Dr. Brown-Séquard has frequently drawn my attention to cases of paraplegia in which amaurosis has also existed, without any other symptoms to suggest disease within the cranium. These cases he refers to the same category as amaurosis from disease of the cerebellum. The blindness in both, he believes, is the result of eccentric irritation. Dr. Wilks also has observed several such cases.

In cases of paraplegia of the lower limbs, there could, of course, be no pressure on the corpora quadrigemina or the optic tracts, and there does not appear to be greater difficulty in assuming a relation to exist betwixt the cerebellum or the spinal cord, and the retina, than betwixt the dorsal region of the spinal cord, and a certain tract on one side of the face in epilepsy artificially produced in the guinea-pig. That there is, in this latter case, a relation, is proved, not only by the fact that irritation of this part excites the fits, but also by the fact that the nutrition of the same part suffers; as on this side lice are often found, and not on the other. To use a common expression, the tract on the face and a certain part of the spinal cord are correlated, and it is, I think, possible that there is a similar correlation between the cerebellum or (posterior column of?) the spinal cord and the retina.

But there is, I think, another explanation. It is well known that there may be disease of the brain, and yet no appreciable alteration to the eye unaided by the microscope. There may be enough disease in the tubercular quadrigemina to cause blindness, and yet little to be seen on ordinary examination. In the production of epilepsy in guinea-pigs, by

section of one lateral half of the cord, the condition in which the fits can be excited by irritating certain parts of the face is not established for several weeks. It is supposed that the epilepsy results, not because there is an injury to the spinal cord, but because disease spreads upwards from the part injured to the medulla oblongata. Changes at a still greater distance even are induced. The nutrition of a certain tract of the face is altered. Possibly in the same way in diseases of the cerebellum, changes of nutrition may creep along (the processus e cerebello ad testes?) to the corpora quadrigemina and optic tract, and thus give rise to blindness.

If this be considered plausible we should seek supporting evidence from other cases of cerebral disease. In a very valuable communication, by Dr. J. W. Ogle, in the Transactions of the Medico-Chirurgical Society, is recorded a case of hemiplegia caused by an aneurism pressing on the crus cerebelli of *the same side*. As it is known that injury of the crus cerebelli does not produce paralysis on the same side of the body, some other explanation must be sought. It is supposed by Dr. Brown-Séquard that the paralysis is reflex, and is the result of irritation of the tumour; and as it cannot be due to the damage it inflicts locally, I venture to suggest that changes of nutrition may have passed along the portio dura and portio mollis (which were compressed and paralysed by the aneurism) to their origin in the opposite side, and that there they produced enough disease to cause paralysis on the then opposite side, *i.e.*, the side on which was the aneurism.

Andral, in his work on Clinical Medicine, narrates cases of disease of the cerebellum in which there was amaurosis, and also cases in which there was not. The following quotation is interesting.

“With respect to the fourth case published by Dr. Michelet in his Thesis, it is deserving of all our attention.

“This was the case of a girl, eighteen years of age, who ten years before her death had had an attack of apoplexy, the result of which was *amaurosis without any other paralysis*,

and habitual headache. An apoplectic cavity of an old standing was found in the right lobe of the cerebellum."

Speaking of another case in which there was hemiplegia as well as blindness, and in which the disease found was softening of one lobe of the cerebellum, Andral writes:—"With respect to blindness, it seems at first that it has nothing to do with disease of the cerebellum, and yet this case is not the only one in which different affections of the cerebellum have been accompanied by a loss of vision. May this fact be explained by the anatomical relations established between the cerebellum and the tubercula quadrigemina by means of the prolongations known by the name of *processus e cerebello ad testes*?"

ON SYNDECTOMY.

BY C. BADER,

Assistant Ophthalmic Surgeon to Guy's Hospital, and Curator to the Royal London Ophthalmic Hospital.

THE term syndectomy is applied to an operation, which consists in the removal of a large zone of conjunctiva and subconjunctival tissue from around the cornea for the relief or cure of pannus and other lesions of the cornea.

The operation was introduced by Dr. Furnari, of Paris. An account of it is given in the *Gazette Medicale*, 1862 Nos. 4, 6, 8, 10, 12, and 14, under the following title:—"De la Tonsure conjonctivale, et de son efficacité contre les Lésions panniformes et chroniques de la Cornée, et contre les Ulcerations vascularisées et les Opacités interlamellaires de cette Membrane, par le docteur S. Furnari" "The requisite instruments (made by Mathieu, of Paris) consist," he says, "of: 1. A forceps à griffes multiples: 2. A pair of blunt-pointed scissors curved on the flat; one of the rings of which has a contrivance for holding a sponge: 3. A small blunt-pointed hook, the concavity of which is sharp, with

which to cut through vessels which have been hooked up: and 4. A small scarifier.

"The patient sits during the operation, and the eyelids are kept apart with a speculum. Commencing his incision near the outer canthus, Dr. Furnari excises a broad ring of the ocular conjunctiva, extending from the margin of the cornea to within three millimeters (about an eighth of an inch) of the line where the conjunctiva is reflected from the globe to the inner surface of the eyelids. Symblepharon might ensue if more was taken away. For the purpose of fixing and turning the eyeball during the operation, a flap of conjunctiva is left at the upper margin of the cornea; this is removed last. The subconjunctival tissue must be carefully dissected off, so as to expose the surface of the sclera. No trace of cellular tissue or of blood-vessels should be left; any which escape the scissors are to be caught up and cut with the sharp hook. The vessels upon the cornea are freely scarified; and their ends, if projecting, cut off with scissors.

"After the bleeding has somewhat subsided, the exposed sclera and ulcerating portions of the cornea are touched with caustic, the vascular only slightly, and the transparent portions not at all.

"The caustic, nitrate of silver, is applied with a brush which has been just before rubbed upon the solid stick. Too strong cauterisation may leave corneal opacities, whilst too slight causes an insufficient exfoliation of the corneal epithelium, and allows the formation of fresh vascular webs. Local application of cold forms the after treatment. A strong irritation, but no inflammation, follows the operation; the abundant local bleeding seems to act antiphlogistically.

"The pain, photophobia, and lacrymation cease 24 hours after the operation. The elimination of the corneal epithelium commences a week later; the blood-vessels upon the cornea atrophy, the infiltrated blood, and lymph become absorbed: the pannous covering of the cornea exfoliates,

and the transparent cornea appears three or four days after the operation: a thick plastic material covers the exposed sclera; a week later a conjunctival margin is again observed along the cornea; the other margin of the conjunctival wound, slightly swollen and granular, is advancing towards the cornea. In from 1 to 2 months all trace of a loss of the conjunctiva has disappeared; the new tissue possesses the characteristics of conjunctiva, and the functions of the eye are not impaired. Any blood-vessels which may have reappeared upon the surface of the cornea are to be excised, scarified, and touched with caustic. Dr. Furnari thinks that the vascular state of the cornea is either produced by the granular state of the palpebral conjunctiva, or by an over-vascularity and thickening of the conjunctiva." The operation is indicated, according to him: "1. In the membranous and fleshy pannus; 2. In phlebectasiae of the conjunctiva and cornea; 3. In simple vascular keratoiditis; 5. In partial vascularities of the cornea; 5. In interlamellar infiltrations of blood or lymph; 6. In corneal lesions resulting from entropium, ectropium and trichiasis; 7. In staphylocomatous conditions of the cornea, consecutive to softening of the latter."

Dr. Furnari believes himself to have been the first to practice such an extensive removal of ocular conjunctiva and subconjunctival tissue, with subsequent cauterisation of the wound, for the above morbid changes of the cornea. He first operated upon some natives of Algiers twenty years ago; and has since repeated the operation upon more than one hundred cases. Others, as may be seen in most books on diseases of the eye, have removed ocular conjunctiva for various corneal lesions, but their results do not appear to have been encouraging. Dr. Furnari relates that a patient, aged 68, with pannus and granulations, having perception of light, who was operated on in 1842, recovered vision so as to be able to read two months after the operation, and this result was permanent.

Two other patients, with granulations, vascular ulcera-

tions of the cornea, intense photophobia and lacrymation, were able to read the smallest type some months after the operation; photophobia and lacrymation disappeared twenty-four hours after the operation.

A case operated upon in 1856 (vascular keratoïditiis, ulcerations of both cornea, photophobia, lacrymation, mere perception of light) is now able to read, and continues well.

Two of four cases of conical (transparent) cornea were cured (?) by the operation, as were also two cases of orbital periodic neuralgia, attended with an undue local vascularity of conjunctiva and cornea.

Relapses are attributed to faults in the after-treatment. Complications, with granular lids, are treated with slight astringents. Any new blood-vessels encroaching upon the cornea after the twentieth day from the operation have to be removed separately. Both eyes should not be operated upon at the same time, but at intervals of several days from each other, since an unusually severe inflammation appears to settle in one or the other eye if both are operated upon simultaneously.

The treatment of trichiasis, entropion, ectropion, and of granulations should precede the removal of the ocular conjunctiva; but the cure of granulations need not be waited for. The granular state of the eyelids in some cases disappears spontaneously, in others it appears to be kept up by the pannous condition of the cornea, and its treatment becomes easier after syndectomy.

The operation had no good result in four cases. In these the entire palpebral conjunctiva was occupied by large, red, flabby, easily bleeding granulations; the eyelids were much enlarged; there was considerable purulent discharge. Singularly the transparency of the cornea remained for a long time. A second operation was required in only a few cases, and never a third one.

Syndectomy is a less dangerous and troublesome mode of treatment than that by inoculation of pus; it can also be performed when the cornea is transparent.

“Syndectomy,” Furnari thinks, “may replace iridectomy in some cases of glaucoma.” He does not express himself clearly as regards the exposure of the sclera ; if it had to be laid bare to the extent to which he recommends, part of the recti muscles and of Tenons capsule would have to be removed, together with the zone of conjunctiva.

I have myself performed syndectomy in twenty-four cases of vascular cornea, some with, others without, granular lids. Chloroform was given in most cases ; the great pain, the bleeding, and the straining of the patient render the operation more tedious when performed without chloroform. The operator stands behind the patient, who is recumbent. A spring speculum is used to keep the eyelids open. The incision through the conjunctiva, made with blunt-pointed (strabismus) scissors, is (the cornea occupying the middle of the palpebral aperture) commenced close to the outer canthus in the right and close to the semilunar fold in the left eye, and is carried through in a circle parallel with the margin of the cornea. The conjunctiva, together with as much of the subconjunctival tissue as can be seized, is then dissected off towards the margin of the cornea, where its attachment is lastly severed. Two small portions of conjunctiva near the upper and lower margin of the cornea, which had been spared for the purpose of rotating and fixing the eye, are removed last. Particular care must be taken to cut and tear off all the blood-vessels and the cellular tissue, from the part of the sclera situated between the insertion of the tendons of the recti muscles and the margin of the cornea. A small sponge is held in the hand which carries the scissors, so as to sponge small vascular spots quickly. As many blood-vessels and as much of the fleshy (pannous) tissue as can be removed from the surface of the cornea, without impairing its lamellated tissue should be taken away, and free scarifications of the blood-vessels upon the latter, and abrasion of the scarified portions conclude the operation. Simple water dressing constitutes the after treatment. Most of my cases were treated as out-

patients. In cases where the eyelids were granular, on the third day after the operation, instillations were ordered of a solution of sulphate of copper (gr. ii ad ʒj. The changes of the surface of the cornea after the operation, appear to contribute much towards the cure of the granulations of the lid; they seemed to decrease in size and number more rapidly than they would otherwise have done.

No serious accidents happened either during or after the operation, except in cases, where, following Dr. Furnari's advice, I had cauterised the exposed sclera. Photophobia, lacrymation and pain generally subsided 36—48 hours later. The swelling and redness of the eyelids were moderate. On the fourth day, an opaque greyish-white plastic substance was observed covering the sclera in two cases; in the remainder the sclera became covered with granulations, which joined the swollen conjunctiva; the swelling of the latter subsided gradually, its free (cut) margin advancing towards the cornea. After 2—3 weeks a smooth coating was in most cases found upon the sclera, and in this coating, a cicatrix was noticed at some distance from the periphery of the cornea; as if new conjunctiva had grown from the periphery of the cornea over the sclera, connecting the original conjunctiva (which had advanced from the other side towards cornea) at the line of cicatrice. Six weeks after the operation, all trace of a loss of substance of the conjunctiva had disappeared. A smooth anemic membrane (conjunctiva?) covered the sclera around the margin of the cornea. The surface of the cornea, 24 hours after the operation, appeared smoother, more nebulous. The blood-vessels upon it (which had been freely scarified and scraped) were larger, varicose, and tapering off towards its periphery; in some cases, small blood-spots were noticed on its surface. On the eighth day, most of these blood-vessels had disappeared, the surface of the cornea becoming more transparent; vision improved rapidly after the operation, patients stating that they saw better every day. The best results were obtained in pannous affections of the cornea, complicated with a thickening and a

varicose state of the blood-vessels of the palpebral conjunctiva (as is frequently seen after the removal of granulations by the application of caustics). Several of these patients, who before the operation could not recognise letters of No. 20, read three weeks after the operation, letters of No. 10.

Some cases were inoculated with pus immediately after syndectomy; others were operated upon at different stages of the purulent ophthalmia, following inoculation; the latter appeared to be followed by less severe suppuration, after the performance of syndectomy.

In four cases the nitrate of silver was applied immediately after the operation (as directed by Dr. Furnari); in one of these an abscess formed in the iris; in a second case, part of the sclera sloughed; in the third, an abscess formed in the cornea; and in the fourth, severe inflammation of sclera and cornea ensued. These results, and the favourable progress of cases which were not cauterised, induced me to dispense with the application of caustics, as being dangerous and unnecessary.

I shall, at a future time, take the opportunity of giving a statistical view of all my cases; of which the following two may be mentioned for the present.

No. I.

C. W., æt. 24, a smith, formerly employed at the military telegraph station, Malta; 22nd regiment; dark complexion; general health good. Contracted granulations in Malta, cause given by patient "caught cold; commenced suddenly."

Duration: *Right eye*. "Blind" for 7 months.

The local treatments, caustics, setons, blisters; the general mercury.

Present state.—*Right eye*. Vision: perception of shadows. Cornea: its surface reddish-grey, uneven, nebulous, overrun, especially its upper half, by large and small blood-vessels. Ocular conjunctiva: vascular, thickened, sending blood-vessels upon the surface of the cornea. Palpebral conjunctiva: vascular, and strewed with numerous large red granulations. Slight photophobia; slight purulent discharge.

Left eye.—Vision: symptoms of asthenopia, otherwise good. Cornea: transparent, smooth. Conjunctiva palpeb.: vascular red, showing numerous minute granulations.

August 1, 1862.—*Right eye.* Syndectomy: by Mr. Bowman. Photophobia ceased 24 hours later; cornea appears less uneven, but more nebulous. Left Moorfields a few days after the operation.

October 16.—*Left eye* gets worse. *Right eye.* Vision: reads No. 16 at 1'. Cornea, lower half almost transparent; upper half nebulous, but smooth, non-vascular. Ocular conjunctiva pale. Palpebl. conjunctiva almost as granular as before. No photophobia; purulent secretion less.

October 30.—*Right eye.* Vision: spells letters of No. 8 at 1'; of No. 4 at 6". Ocular conjunctiva: All trace of the incision and of the loss of substance of the conjunctiva have disappeared. The conjunctiva around the margin of the cornea is smooth and anemic. Cornea: Upper half slightly nebulous; lower half transparent. The granulations of the palpebl. conjunctiva are red, hard, and of unequal size; they appear less in number; purulent secretion continues.

No. II.

M. C., æt. 20, a servant, fair complexion, general health good; contracted granulations in London. Cause given by patient "caught cold." Duration 4 years. Treatment, caustics and blisters.

Present state.—*Right eye.* Vision: Perception of shadows; not able to guide herself. Ocular conjunctiva: thickened, vascular. Palpebral conjunctiva: thickened, not granular; but highly vascular, the blood-vessels being large varicose. Cornea: its surface uneven, nebulous, overrun by numerous large blood-vessels, which, from the conjunctiva, encroach upon it from all sides. No purulent secretion, but intense photophobia, lachrymation, and supraorbital pains.

June 29, 1862.—*Left eye.* Syndectomy, by myself at Guy's Hospital. Next day photophobia, pain, and lachrymation completely ceased, the right eye being closed.

July 3.—The exposed surface of the sclera is covered with a plastic, white, and opaque substance; the adjoining conjunctiva is slightly swollen; slight purulent discharge. Cornea: its surface smoother; the pupil faintly seen; the blood-vessels large

more varicose, containing dark red apparently clotted blood; none pass over the corneal margin, towards which their ends taper.

August 12.—Conjunctiva, less thickened and varicose; cornea, slightly nebulous, pupil active; patient sees to go about alone, and does common household work.

September 4, 1862.—Patient states that vision is improving a little every day; she distinguishes the form of men and women across a street. All trace of a loss of conjunctiva has disappeared.

REPORT ON CASES OF GRANULAR CONJUNCTIVITIS TREATED BY INOCULATION WITH PUS.

By C. BADER, *Curator*.

From October, 1857, to October, 1862, 130 cases (170 eyes) of Granular Conjunctivitis (Synon. Granulations, Granular Lids, Granular Ophthalmia), were treated by Inoculation.

The granular conjunctivitis was complicated with the following morbid changes of the cornea:—

1. Cornea yellowish-grey, opaque, and vascular, pupil not visible.
2. Cornea uneven, nebulous, vascular, pupil hardly visible.
3. Cornea, its upper part vascular, nebulous; its lower part nearly transparent, its surface uneven.
4. Cornea having become vascular while the eyelids were kept closed during the treatment of the fellow-eye by inoculation.
5. Cornea vascular and nebulous, with traces of perforation, opacities, and anterior synechiæ.
6. Cornea vascular and staphylomatous.
7. Cornea vascular and ulcerating.
8. Cornea vascular, but otherwise transparent.
9. Cornea transparent.

Besides cases of granular ophthalmia, some cases of xerophthalmia, and of uneven, vascular, and opaque, as well as of smooth and opaque cornea, were inoculated, the conjunctiva being thickened and anæmic, deprived of its follicles.

The term *vascular cornea* is applied to a cornea the surface of

which is more or less overrun by blood-vessels passing over from the ocular conjunctiva, and the term *pannus* is used, in the present paper, in the same sense.

Inoculation cured (destroyed) the granulations in all the cases; the conjunctiva becoming smooth and somewhat anæmic.

None of the staphylomatous corneæ became perforated, and the ulcerating corneæ healed rapidly during suppuration (subsequent to inoculation).

Several of the transparent corneæ, and of the corneæ, the lower half of which was transparent, became perforated.

No change was effected in xerophthalmia.

Different kinds of pus used for inoculation :—

a. Gonorrhœal pus from the urethra, or from a purulent ophthalmia infantum, the child's mother suffering from gonorrhœa, or pus from eyes which had been inoculated with gonorrhœal pus.

b. Pus from cases of ophthalmia purulenta infantum, where the mother of the child had either a slight yellow vaginal discharge, or none at all.

c. Pus from cases of ophthalmia purulenta infantum, which had not been under treatment, where the state of the lids indicated a decline of the disease, and where perforation of the cornea had not occurred.

Observation has shown that pus *a* will produce the most severe, pus *c* only a moderate purulent ophthalmia.

Cases with vascular cornea (*pannus*) with or without granular conjunctivitis, the pupil being not or barely visible, and cases of xerophthalmia were inoculated with pus *a*. The same pus was used when the principal part of the cornea was so vascular and opaque as almost to hide the pupil from view, although the lower margin still remained transparent. A recovery from granulations, with clearing of the opaque upper and central part of the cornea being deemed an object of sufficient importance to justify the risk incurred of inducing perforation of the lower transparent part.

Granulations with *pannus*, the pupil being clearly visible, were inoculated with pus *c*.

Granulations with transparent cornea were inoculated with pus *c*.

Other kinds of pus which were tried were not equal to the above in their effect.

Mode of inoculation :—

A small drop of the pus to be used for inoculation was placed with the tip of the little finger upon the conjunctiva of the lower lid and left there.

The eye not inoculated was kept closed, until the acute stage of the purulent ophthalmia produced in the inoculated eye had subsided.

The following seemed the most effectual mode for keeping the uninoculated eye closed and secure from risk of accidental inoculation. A thick layer of Canada balsam, or gum mastic, was spread over the skin of the eyelids, then wadding was laid on to the level of the bridge of the nose and margin of the orbit, and retained in position with a light bandage or strapping, and the bandage was examined occasionally and re-adjusted if it had become loose.

Treatment of the inoculated eye :—

Both eyes were inoculated when the pannus was equal in degree or nearly so in both.

The treatment consisted in mere cleanliness by washing away the discharge from the eyelids with tepid water every hour if the pain was very severe, twice a day (morning and evening) if there was moderate or no pain.

In severe cases of pannus it seemed desirable to obtain abundant suppuration; the purulent discharge was therefore not washed away for one or two days after suppuration had commenced.

The unsatisfactory results obtained by some persons from inoculation, seem to be due to a desire to check the purulent inflammation. A treatment which tends to check or moderate the inflammation (suppuration), arrests the destruction of the pannus and of the substance, which helps to form the granulations, and leaves the case in as bad, or in a worse, condition than it was before inoculation. Perforations of the cornea and changes in the eyelids were not specially attended to while the purulent discharge continued. A case was considered cured, when the granulations were destroyed, the palpebral conjunctiva having assumed its smoothness.

I believe all cases of granular conjunctiva, causing vascular cornea, to be curable by inoculation. The difficulty consists in producing such a suppuration (purulent ophthal.) as will destroy

the granulations and the pannus, without causing destruction of the entire cornea.

The acute suppuration lasted from one to six weeks; the chronic suppuration from two to eighteen months. Some cases got well in two, others in eighteen months, cleanliness being the sole treatment.

Remarks.—All cases of granular lids might be cured by the same kind of pus, if some means of protecting the cornea were found.

Those who treat cases by inoculation ought to be familiar with what are called granular lids. Minute red granulations, giving the conjunctiva palpebrarum (that part which lies upon the fibro cartilage) a red velvety appearance, have been inoculated by some with bad results.

All cases had previously undergone such medical and surgical treatments as is often resorted to in these protracted cases, such as mercury, leeches, scarifications, blisters, caustic, &c., and more than two-thirds were supposed to be incurable.

The cicatrices caused by scarifications cannot be removed by inoculation, and prevent the recovery of the cornea, if seated over it.

Among the 170 inoculated eyes, two corneæ were entirely lost, and ten became perforated during suppuration.

It is proposed to give a more detailed statement of the results at a future time, when they may be more completely ascertained.

ON KERATITIS.

BY F. MARSDIN, M.R.C.S., &c.

HAVING observed these cases under the care of some of the most eminent ophthalmic surgeons not unfrequently go on for three, six, nine, and sometimes twelve or more months, it became a matter of interest to me to determine the value of the operation for division of the circular fibres of the ciliary muscle, or so-called ciliary ligament, in facilitating the cure of this disease as practised at the Westminster Ophthalmic.

It is a familiar fact to those conversant with these cases

that in some the cornea acquires increased convexity, and in certain cases there is an evident depression around the cornea in the situation of the ciliary ligament, indicating a constriction here, and it is further affirmed by such as have watched the result of the division of this ligament in certain interstitial deposits in the cornea, that it exercises a marked influence in promoting their absorption. Coupling these facts together, I was led to anticipate the operation might be of benefit in these cases.

As to its *modus operandi*, the views of the originator have already been laid before the profession; but inasmuch as cases have lately been brought under my observation in which tapping of the vitreous was attended with benefit in this disease, it would appear that a portion of the good resulting from the operation must be attributed to this cause, in addition to those given; but seeing the benefit derived in these cases is not so great as in those with the incision made in the ciliary region there appear no good grounds for altering the situation of the puncture particularly, as the former involves greater risk of injury to the retina. Carrying the incision beyond the free margin of the cornea, there is also reason to believe, is attended with disadvantage, and leads to a retardation rather than an acceleration of the cure of the disease being generally attended with prolapse of the iris which gives rise to irritation and more severe inflammation.

Two difficulties present themselves in an endeavour to estimate the value of this operation in this affection. 1. These cases frequently get well of themselves, or under the mildest forms of treatment. 2. In some of the cases I could not perceive the course of the disease interfered with by the operation, or only a removal of the photophobia; the first may be removed by observing the rapid improvement that occurs after interference, and a record of a large number of cases. With reference to the second, I presume we must not expect to bring the cure of all the cases under our control by this operation any more than glaucoma by iridec-

tomy, but be satisfied if we facilitate the recovery of the majority.

My reason for laying these imperfect observations before you is to draw the attention of those who have more ample opportunities of carrying out these inquiries than of laying any set rules for their guidance, that supposing the remedy to be found of that value which its advocates claim for it—that, if possible, such definite conclusions may be arrived at that we may be enabled to decide that the operation will be of service in any given case.

I append a case or two by way of illustration. Acknowledging the connexion of this disease with syphilis, I tried mercury; but, except in alterative doses, my observation accords with that of others, that it acts injuriously. Iodide of potassium, or of iron and free iodine, have appeared to be of service in some cases.

Joseph P., æt. 22, sawyer. He has the characteristic expression of congenital syphilis, depressed nasal bones, notched peggy teeth, &c.

May 6th, 1862. *Right eye.* Six week ago he began to feel pain in the right eyebrow, extending across the temple to the occiput. In two days the sight was so far gone that he could only discern light from darkness. The sight got gradually worse for 14 days, so that he had only faint preception of light; it then improved a little so that he could again discern objects; and it kept in this state for one week. It then became worse again, and remained so for 4 days, and he could not discern objects. During this time he had been undergoing the ordinary treatment of iodide of potassium, mercury, and blisters.

He cannot now make out any letter of No. 20 of the test types. Cornea is steamy, semi-transparent, pupil contracted; a vascular crescent encroaching on upper and lower margins, and stray vessels prolonged beyond these about $\frac{1}{8}$ of an inch. Photophobia. Bright pink sclerotic zone. Sclerotic vessels gorged. No pain unless he exposes it to a bright light.

Operation.—Haust Opii h. s. s. Calomel and Opium. Lini-
ment Bellad. app. around the eye. Generous diet.

May 12.—The gums are touched. Stop the calomel and Rp. Potass. Iodid. c. Quin.

May 16.—Cornea clearing rapidly; only a slight opacity in centre. Vascularity of conjunctiva diminished.

May 17.—The pink zone around the cornea has disappeared from the upper and outer part of the circumference. The vascular crescent on upper margin is fading, as is also the portion of the pink zone that remains. Altogether the eye is less vascular, and there is less photophobia.

May 21.—No photophobia. There is still a slight steamy spot opposite the pupil; the rest of the cornea quite clear.

June 4.—Can read the minion type c. right eye. Can see better in a subdued light.

Rp. Quinine and Iron. c. Tinc. Iodinii.

June 7.—The right eye is well.

June 12.—*Left eye.* At æt. of 4 years had variola, and has only had partial vision in this eye since. Severe inflammation has now attacked this eye; it has been more or less affected for the last five months, but not sufficiently so as to justify me in performing the operation. The cornea is now steamy, there in a crescent above and below, and a bright sclerotic zone. Conjunctiva much injected. Photophobia. Sclerotic vessels purple. Can just see No. 20, but not to read.

Operation.—Stop medicine and Rp. Potass. Iodidi. Applic. Lot. Bellad. to left eye t. d.

June 14.—Can read No. 19. Cornea clear. Suffers great pain in brow and ball of eye.

June 17.—Reads No. 16 to-day. Cornea clearer. Upper $\frac{1}{2}$ of zone faded; lower about the same.

June 26.—Very slight sclerotic redness in left. Returned to work a few days after this date.

November 29.—This patient has subsequently had a second attack, under which, however, he progressed so favourably as not to require interference.

Edward M., æt. 21, waiter. Three years ago the left eye became inflamed, and he was nearly blind with the same for three months. It gradually got well.

Fourteen days since inflammation began in the right eye, it was blood-shot—photophobia. He was directed by his surgeon

to use a lotion of argent. nitrat., and take a purgative daily. Under this treatment the eye got gradually worse.

June 13, 1862.—There was a pricking sensation in the eye as if of sand in it; the globe felt very heavy, and he experienced a dull heavy pain in the brow.

June 14 —There are the widely separated and notched peggy teeth and other signs of congenital syphilis, but not so well marked as in the last case. The whole cornea is steamy; a vascular crescent above, and fine vessels extending from it $\frac{1}{4}$ of an inch upon cornea and a bright sclerotic zone. There is a whitish vascular patch of lymph opposite the lower half of the pupil. Conjunctiva vascular. Photophobia not intense. Lacrymation principally in morning. Cannot make out a letter of No. 20 test type.

Operation.—Mercurial o. n. Liniment. Bellad. o. n.

June 17.—Cornea clear at circumference; zone fading above; pain in the temple through the night.

Rp. Mist. Quinine and Iron c. Iodine,
Lot. Belladon.

June 27.—Can see fingers, but not to count them. Sees better in the evening. Iris with patches of lymph on it. Pain in temple does not begin until 4 A.M. now.

Rp. Calomel c. Opio. o. n.

July 1.—No pain at night. Increase of photophobia. Paint upper lid c. Tinc. of Iodine.

July 7.—White patch is less. Photophobia disappeared.

July 18.—Sclerotic zone has vanished from upper and outer $\frac{3}{4}$ of circumference of cornea; still a reddish patch with white margins nearly opposite the centre of the cornea. No photophobia or pain in the eye at night. Can read No. 19. Sclerotic zone still visible at lower and inner part of circumference of cornea. Returns to his duties to-day, taking his medicine occasionally.

OPHTHALMOSCOPIC EXAMINATION DURING SLEEP.

By J. HUGHLINGS JACKSON, M.D., M.R.C.P.

*Assistant-Physician to the Hospital for Paralysis and Epilepsy—
Assistant-Physician to the London Hospital—(late) Physician to
the Metropolitan Free Hospital.*

It is scarcely necessary to say that my reason for examining the eye during sleep, was to help to form some idea as to the condition of the circulation in the brain itself in this physiological condition; the retina and the brain being supplied by branches of the same trunk, the carotid, and these by the same vaso-motor nerves. We may consider the retina as part of the brain extruded through an opening in the skull.

Still I have drawn no conclusions as to the condition of the circulation of the brain in sleep, as the subject requires to be studied on a very extensive basis, of which these observations can form but one part. Indeed I study the physiology of sleep, in order to learn somewhat as to the circulation in the brain in certain allied pathological conditions. For instance, I am anxious to know the condition of the veins and arteries of the brain in the profound sleep, or, perhaps more correctly, in the stupor which follows a paroxysm of epilepsy. I have examined the retina in this condition and several times in cases of severe congestive headache after a fit. The results of these and of many other examinations in cerebral cases I hope to have the pleasure of giving in some future number.

A girl, aged 11, was admitted into the Hospital for the Epileptic and Paralysed, under the care of my colleague, Dr. Brown-Séquard, for hemiplegia, which had existed several years. Of this, at the time when the following observations were made, there was little or nothing left, and the child was in fair general health.

I give the following extracts from my diary as the simplest way of recording several observations:—

Sept. 3rd.—I tried, first, to examine the eye without using atropine, but the pupil was so small, as is usual in sleep, that I could not illuminate the fundus. I therefore dilated *one* pupil by atropine, and then examined the fundus of both eyes when the child was awake. I found the optic discs normal. They were equally well coloured, but not abnormally so. I had examined her sight carefully before dropping in the atropine, and found it perfect. When in deep sleep, one pupil was contracted; that dilated by atropine remained enlarged. By the aid of a very intelligent nurse, who held up the upper lid, I was enabled to examine the optic entrance, to which, for the present, I confine my observations. I found that the optic disc was whiter, the arteries a little smaller, and the veins larger than in waking. The veins were thick, and almost plum-coloured. The neighbouring part of the retina also was more anæmic.

Sept. 6th.—The pupil was now rather small. I saw the optic disc steadily, and could confirm my first statement. The arteries were certainly smaller, and the veins larger than in waking. The other parts of the optic disc were whiter, as was also the neighbouring part of the fundus. She had been well tired by a long romp with the nurse.

Oct. 3rd.—The pupils had regained their normal size. I again put atropine in the right eye, and examined with the ophthalmoscope. I carefully noted each vessel, especially the smaller ones, and learnt by heart the position and size of both veins and arteries, and also the condition of the optic disc as to colour. At night I examined the eye during sleep. The pupil was smaller than when the child was awake, but I luckily saw well for a long time. The optic disc was not so red, the arteries were certainly smaller, and on this occasion, I think, the veins were no larger, and about the same as when the child was awake. I then roused her, and examined under similar conditions of light, position, &c. She was awake, but sleepy. I found that the arteries were larger; but, on looking again, I found them smaller, as in sleep. They alternated several times. I could not long dwell on

the disc; and my opinion is, that the alternation was gradual.

Oct. 16th.—A girl, aged 11, a patient under the care of my colleague, Dr. Ramskill. I dilated the right pupil with atropine. In sleep it remained dilated; the other was contracted. I saw well in this case. The child was deeply asleep, and I had the optic disc under view for a long time. All I can say is, that the disc itself was rather paler in sleep. I roused the child till she was fairly awake, and the only difference then was, that the disc was a little redder.

The pupil, under the influence of atropine, dilated to the fullest extent when awakened; twice the size it was when the child was asleep. The contraction was not due to the light only. It was the contraction of sleep.

Oct. 21st.—I put atropine in the right eye, and dilated the pupil to the fullest extent. The child is a somnambulist, and I found her in the ward at 10 p.m., in the arms of the nurse. The left pupil (the one without atropine) was not so small as usual in sleep. The other was as large as it was when she was awake. She was apparently asleep, however. I examined the eye, and then fairly awakened her, by pinching and making her speak, and getting her to look in certain directions. I again examined her eyes when she had gone to sleep in bed. I feel convinced that the arteries were a little smaller, and the veins larger. I saw well, and for some time.

Oct. 24th.—Atropine as usual. I saw well; the disc was whiter, and the arteries smaller.

I ought to observe, that in all these examinations the difference in the size of the arteries and in the coloration and the optic disc during sleeping and waking was but slight.

ON THE EFFECTS OF THE CALABAR BEAN ON THE EYE.

BY D. ARGYLL ROBERTSON, M.D., F.R.C.S.E.

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I HAVE already fully detailed the results of most of my experiments with the Calabar bean with regard to its action upon the eye; but having been requested to give a short account of them for this Journal, I subjoin an epitome of them.

The first effect produced by the local application of the bean is upon the accommodation of the eye producing a degree of myopia proportionate to the strength and quantity of the solution applied. Thereafter a sensation of straining and heaviness is felt in the eye similar to that experienced after a prolonged near inspection of fine objects, or to that characteristic of asthenopia. Objects also appear larger and nearer than natural. After a short interval the pupil becomes contracted until, when a strong solution is used, it does not exceed a third of a line in diameter.*

As the effects pass off, the accommodation returns to its normal condition, and *secondarily* the contraction of the pupil subsides. During the action of the bean, the pupil is still sensitive to the influence of light.

The next point investigated was its corrective power on an eye under the influence of atropine; when it was found to have the power both of counteracting the dilatation of the pupil, and of altering the accommodation of the eye.

The ordeal bean was also found to be antagonistic in its action to Daturine.

According to my experience, Daturine has precisely similar effects when applied to conjunctiva to those of atropine. It is weaker than atropine, and may act to a greater extent on the iris, and less on the ciliary muscle than it; but of the fact that it does act upon the latter structure I am quite convinced—although that is contrary to the experience of M. Gobert de Lamballe.

* As a consequence of this less light is admitted to the retina, and objects appear darker than natural, and sympathetically the pupil of the other eye becomes somewhat dilated.

To explain the occurrence of astigmatism noted by Mr. Bowman, to follow the application of a solution of the bean to the eye, and of the irregularity of the pupil mentioned by Mr. Soelberg Wells, I was led to frame the theory, that the solution of the Calabar bean might act more powerfully on that part of the ciliary muscle and sphincter pupillæ opposite which the drop is placed, and thus produce these results. To test the truth of this hypothesis, I performed the following experiment:—

I first noted the amount of astigmatism present in both my eyes, and found that with my right eye horizontal lines were very slightly blurred at about 20 feet distance, and that my left had similar astigmatism only to a little greater extent. From want of a series of cylindrical glasses, I was unable to ascertain the exact amount of astigmatism. The pupils measured a line and a half each, and were perfectly round.

At 6.32, my friend Dr. Grainger Stewart, applied a small quantity of a strong syrup of the extract of Calabar bean to the lower portion of my left eye, close to the margin of the cornea, and prevented the solution being spread over other parts of the eye, by keeping the eyelids open for about five minutes, and then drying the surface of the globe before allowing the lids to close. This application caused some degree of irritation and considerable deep conjunctival injection at that part where it was applied. In about ten minutes myopia was produced, and shortly after the pupil became contracted, but remained quite round. Another drop of the syrup was now applied in the same manner as before. In an hour after this second application, the left pupil was about $\frac{1}{2}$ line in breadth and irregular in shape, the lower margin being almost level, while the rest formed an irregular arch upon it, the horizontal diameter being markedly greater than the vertical.

The outline of the pupil became still more irregular, until it presented much the appearance of a parallelogram. As the effects subsided, the pupil gradually resumed its natural shape and size. I frequently tested the condition of my eye for astigmatism, but found it very little altered, as far as I could judge.

This experiment is by no means conclusive, either in favour of or against my supposition, as although little or no astigmatism followed, there was decided irregularity of the pupil, which I

had not noticed before in the course of my experiments. This point, I think, may be deserving of further investigation.

From the nature of the effects produced by the ordeal bean on the eye, its action may be considered to be that of stimulating the ciliary nerves.

The cases in which its action may be expected to prove beneficial are—1st. Where atropine has been employed to render ophthalmoscopic examination more simple and complete, or to enable the condition of the accommodation of the eye to be more accurately determined. 2nd. In retinitis to diminish the access of light to the retina. 3rd. In paralysis of the ciliary muscle and sphincter pupillæ which is apt to follow continued fevers or other debilitating disease. 4. In cases of ulceration at the peripheral part of the cornea where prolapsus iridis has just occurred or is expected to take place.

I would here direct attention to the fact that to Dr. Thomas R. Fraser belongs the credit of the discovery of the myositic action of the ordeal bean. I desire thus to acknowledge his claims, as some have erroneously ascribed that credit to me. What I have done is to investigate fully the action of the bean on the eye, and to point out its practical applications.

PART II.

Periscope.

FURTHER REMARKS ON GLAUCOMA AND THE RESULTS OF
IRIDECTOMY.

BY PROFESSOR A. V. GRAEFE.

(Archiv. für Ophthalmologie, Vol. viii, 2.)

(The English reader has access to some of the earlier papers by Professor von Graefe on this subject, in the able translation by Mr. Windsor, of Manchester, published by the new Sydenham Society. To the present version of a valuable paper containing his more recent views, I have added a few notes within brackets [].—W. BOWMAN.

Is immediate operation desirable in all cases of acute glaucoma? At what period of the attack may we reckon on the efficiency of iridectomy? No competent operator may be at hand; should in that case a patient suffering from acute symptoms go a long journey to find one? Professor v. Graefe decides that he had better do so, than risk delay; that he may do so with safety as regards the eye, though, of course, at an inconvenience; but the urgency in acute cases varies. The urgency does not depend on the intensity of redness or chemosis, nor on the amount of tension, or pain, but *above all*, on the *degree of impairment of sight*. As long as the patient is able to read large print, and the field of vision is not contracted (*i.e.*, if he has not totally lost sight in any portion of the field of the affected eye), the operation may be deferred a few days, if need so require; especially if the inflammation tends to abate, and the sight to improve somewhat under the treatment employed. There are even some cases in which v. Graefe would prefer waiting a few days, *viz.*, where the loss of sight is moderate, but the pain extreme, with an inclination to vomit. Here it is well to allay pain, first by injection of morphia (gr. $\frac{1}{8}$ to $\frac{1}{3}$) under the skin of the temple, and procure at least one good night, so as not to operate while the patient is under excitement. [I should not delay the operation on this ground, but give chloroform.] On the other hand, perfectly good eyes sometimes lose all perception of light very suddenly from glaucomatous disease, hence styled by v. Graefe *Glaucoma*

fulminans (called apoplexy of the retina before the ophthalmoscope was in use). The symptoms of intraocular pressure arise very rapidly, enlarged pupil, flattened anterior chamber, stony hardness of the globe [T 3], anæsthesia of the cornea, and violent ciliaralgia. The intensity of none of these symptoms, however, equals that of ordinary acute glaucoma, and yet the sight is lost in a few hours, or sometimes even in half an hour. The ophthalmoscope then shows usually a diffuse dulness of the aqueous and vitreous humours, and as far as we can judge, an overfulness of the retinal veins. There soon appears proportionally very rapid decrease of the arteries and excavation of the optic nerve. This last, in one case, occurred within a few weeks after the attack. It is true (proceeds the author) that the phenomena of vascular excitement may accompany the blindness from the first, but sometimes they follow it in so peculiar a manner, that we must regard the onset of tension to have been more sudden and severe than usual, and this either absolutely or relatively. An uncommon rigidity of the sclera on the one hand, or an unusual disposition in the optic disc to yield, or inability of the retina to bear compression, on the other, would alike explain the sudden blindness from a moderate hypersecretion. The explanation is probably this; whether the propulsive power of the heart be too small, or the coats of the arteries diseased, the result will be a ready development of the arterial pulse (impeding the retinal function) and consequently an entire cessation of blood in the retina.

A case of "Glaucoma fulminans." Left eye absolute glaucoma [*i.e.*, having run its course to complete blindness] with cataract. Right eye affected five weeks. Patient stated that one morning, without any warning, a cloud had rapidly come on, with rather violent ciliaralgia, ending, in one hour and a-half, in total blindness. He was sure he could not afterwards see the brightest sunlight. Vascular excitement with lacrymation occurred only after some days. After five weeks, when first seen, the pupil was very widely dilated, humours dull, globe stony hard, no perception of light; and, as pain had nearly subsided, no operation was undertaken. Two other cases were more satisfactory; in both one eye was blind from previous glaucoma. The eyes resembled the last, only the media were more obscure. In the first, dilated retinal veins and a normal level of the pupil, could with great difficulty be seen, in the second, nothing could be discerned of the internal tissues. In the first, there might have been perhaps a remnant of quantitative perception of light [*i.e.*, the mere perception of light and shade, not of objects or colours, or even of locality, and vaguely of intensity; which has sometimes been called "perception of shadows," but which may most simply be called "perception of light"]. A bright lamp held near the eye was unperceived, but if the light was intensified by a strong lens, and directed by the sclerótica on the retina, while the eye was turned sideways, she made such positive statements, that I concluded some portions of the retina were still excitable.*

* It is by no means always easy, in cases of glaucoma, to ascertain whether there be still a remnant of sensibility to light or not, especially if this remnant has its seat in a very small and eccentric part of the field. I may here

As the blindness was of such short duration, the injection-phenomena were only slightly indicated. On the day of the operation (which I performed about eight hours after the blindness began) the patient was able to see the movement of a hand, on the third day he counted fingers. The field of vision proved to be very irregular, with many and great interruptions, caused by the amount of hæmorrhage of the retina. They disappeared gradually. With their absorption, the sight became very satisfactory, (type No. 3 at 10", and visual field normal) and has remained so until now, *i.e.*, for the space of a year and a half.

In the other case, operated on on the third day, no quantitative sensibility of light was left; it was said to have become extinct during the first two hours of the disease. On the second day, violent injection, with somewhat serous chemosis appeared. The results of the operation were only gradually manifested, and remained imperfect. No sensibility to light could be detected until the second day after the operation, when it appeared, at first only slightly, and in one direction, upwards and outwards, but afterwards gradually increasing. The patient was not able until a week afterwards to count fingers in a small portion of the field. Uncommonly numerous and large retinal ecchymoses appeared. In two months the recovery was so complete that the patient was able to read with convex glasses (No. 6 at 10 in.); though at the same time there existed an indistinctness of the eccentric sight inwards (20°), and a periphtric defect (40°) in the same direction. The optic nerve was slightly excavated, and rather whitish. According to subsequent communication by letter, the sight has decreased lately from No. 6 to No. 8, and has remained for nearly a year in this state. We see, therefore, that iridectomy, performed on the *third* day of glaucoma fulminans, is by no means complete in its result.

mention a remarkable fact, *viz.*, that I have frequently had patients, who were unable to distinguish the light and shade of a brightly burning lamp, and yet could at times catch a glimpse of things at a distance. I considered these statements illusions which often happen with the blind, until some remarks of one patient fairly startled me. On accurate examination, I found that he had a very eccentric field of very small size; at 12 feet distance it had a diameter of 6"—8". Within this circle the patient could clearly distinguish the movements of my hand, and even count my fingers. I then repeated the examination with the lamp, and found he was quite unable to see it. I then, by means of a piece of ground glass, diffused the light of the lamp, and brought it to bear upon that part of the field of retina which I had ascertained to be functionable. The result was negative. On a daylight examination of the patient, I met with no better success, and could only obtain positive statements, when the back was turned to the light, and the object placed in the small field of vision. The explanation of this, which I have observed in four or five other cases, is still a problem to me. The size of the field cannot be the sole cause, as, however small it may have been, in the cases I have mentioned, it was always strongly lighted.

I consider it my duty to dwell upon this, because it goes to limit, in a certain degree, that which I have previously stated.

Judging from the cases I mentioned in my former papers, one might feel inclined to depend upon the complete effect of an operation performed a fortnight after the beginning of the blindness, even though there might appear to be some advantages in favour of its performance during the first few days; but I then pre-supposed that there was still quantitative sensibility to light, which is not the case in the examples I am about to mention.

To guard against mistakes in prognosis, I give here the fourth case, in which operation after fulminating glaucoma had hardly any effect upon the sight, and was in the end of no benefit whatever. About the end of 1856, Mad. N., a lady from Silesia, 55 years of age, became suddenly blind of the right eye. In a few weeks inflammation appeared, accompanied by severe ciliaralgia. The November of the following year, she was driven by continuous pain to consult me. I found absolute glaucoma of the right eye, with commencing cataract, and as the tension was very great, I performed iridectomy for the purpose of soothing the ciliaralgia. Next month the cataract was complete, but the eye itself slacker, and I dismissed my patient with rules of conduct regarding the still sound left eye, charging her to continue the treatment according to my injunctions, until she perceived the appearance of any suspicious signs in that eye. Between that time and the 16th of December, 1860, the left eye remained sound, and failed in evincing any precursory signs of a glaucomic attack.

On the morning of the said day, however, the patient who had suffered for some time from rheumatic pains in different parts of the body, but had slept the past night perfectly well, felt, while at breakfast, a grey mist come suddenly over her left eye, increasing so rapidly, that in an hour she could only distinguish the outlines of the largest objects, and by noon it had become total blindness. In the evening the eye began to pain her, and the next and following days, according to the attendant's statement, redness and tears appeared, accompanied by violent ciliaralgia, which deprived the patient of sleep. All these symptoms continued in spite of copious bleeding in the neck, and local drawing of blood, which was ordered by the surgeon of the place. When I saw the patient again for the first time, knocked up by the journey and the pain she had gone through, I found extreme mydriasis, the iris reduced to a narrow ring, and discoloured to a greyish hue, anterior chamber very shallow, upper half of the cornea anaesthetic, aqueous humour clouded and dull, as was the cornea on its surface at the lower part, the back of the eye indistinct in consequence, the globe extremely hard, slight injection of the anterior ciliary vessels, few tears,

and no sensibility to light at all. The diagnosis pronounced it to be glaucoma fulminans, and I performed iridectomy the same day. In a few days the ciliaralgia had entirely disappeared, the aqueous humour and cornea were considerably clearer, the sensibility of the cornea returned, the tension of the eye diminished, and the iris was somewhat broader and less discoloured. Especial observation was directed towards the existing degree of sensibility to light. The first four days after the operation, the result was negative, on the fifth day however a trace of light appeared, though only within a narrow limit, upwards and outwards; and the statements of the patient were so uncertain, that I still remained in doubt. But all doubt was removed, when, in a few days, the patient was able clearly to distinguish the light and shadow of a brightly burning lamp at 1 foot distance, the lamp being held about in the direction of the optic axis, and inclined a little outwards on one side. This sensibility to light went on increasing in a very slight degree until about the third week after the operation. The patient could then discern a moderately bright lamp at 3 feet distance, the field of vision lying outwards, in the form of a slit, which, though too small to be measurable, corresponded to an opening of 20° . I examined the eye with the ophthalmoscope towards the end of the second week, and found the refractive media perfectly clear, a deep excavation of the optic nerve, on the edge of which the veins were very much displaced, small arteries without pulsation, and a whitish discoloration of the disc. There were enormous retinal ecchymoses in various parts of the eye, partly in the inner plane of the retina (where they were darkest, in the form of large opaque cherry red flakes, completely covering the retinal vessels), partly along the vessels themselves (in irregular stripes or spots, forming larger figures where the vessels are divided), and partly also behind the visible vessels, in the shape of round light red, transparent spots.* At last suffusions appeared, more connected, of a bright red colour, but not opaque, which, judging from their free diffusion, and their relation to the coarser choroidal veins, originated on the surface of the retina. Though the pigment-layer was visibly covered by these extravasations, the choroidal veins still formed sharp edges in many places; this, as well as the great resistance offered by them to a hæmorrhagic suffusion on the surface of the retina, is explained by the projection of the vessels, the coarser ones especially, on the inside of the choroid. In the corpus vitreum there were some hæmorrhagic flocculi which attracted my attention by their mobility and tendency to be pushed toward the back of the eye. I still hoped, that with the disappearance of the ecchymoses, the perception of light might increase, but

* This is the most common form in cases of acute glaucoma, after iridectomy.

the reverse was the case. The slit-shaped field narrowed, and in six weeks after the operation all sensibility to light was extinct; while the ecchymoses had decreased, and in parts disappeared altogether.* Atrophy of the optic nerve became more and more apparent. The conclusion arrived at is, that iridectomy had abated the inflammation, but had done nothing for the blindness. This case clearly proves, when opposed, to the one before quoted, that it is expedient to act with all possible speed when dealing with cases of glaucoma fulminans. The violent hæmorrhage which follows upon iridectomy in all cases of glaucoma fulminans, argues an enormous stagnation of blood, taking place in the veins from the beginning of the disease. Whether the total blindness is to be ascribed more to the disturbance of the circulation, viz., the interrupted entry and discharge of blood, or whether it is caused by direct compression of the conducting fibres, is a doubtful point, especially in cases of acute glaucoma.

If we decide in favour of the latter cause, we must duly take into account the uncommonly rapid formation of a deep pressure excavation; however, the two views are so closely connected, that I doubt whether an impartial decision can be arrived at.†

PART II.

TREATING OF THE DISADVANTAGES, BOTH REAL AND SUPPOSED, OF IRIDECTOMY, IN CASES OF GLAUCOMA.

The more the value of iridectomy in glaucoma is acknowledged, and its use extended, the more urgent becomes the duty of dwelling upon its possible deficiencies, and it will only tend

* The suffusion on the outer plane of the retina, and the light-red spots on the further side of the vessels, vanished first, while the dark red patches between the retina and hyaloid went away more slowly. These suffusions disappeared by becoming gradually lighter, and the spots thinned by dissolving into small dots and groups of dots; but the patches went away by very slow concentric decrease, the centre preserving its dark opaque appearance, and only the edge, as it melted away, becoming of a lighter colour. I have more than once, under like circumstances, watched the various modes of disappearance, giving them special attention when to pre-existing chronic glaucoma was added commencing scleral-staphyloma, with highly inflammatory paroxysms. Then the ecchymoses take a tumultuary character, and even spread over the surface of the choroid.

† [The exact period of the iridectomy is not stated in this case, but it was probably within a week. Had not tension returned with the renewed loss of sight? It seems also probable that some tension (simple glaucoma) may for some time have preceded the acute attack, though unobserved by the patient. This at least would afford a clearer explanation of the deep excavation of the disc, with great displacement of its veins, and white atrophy at so early a period as, say, the end of the third week from the acute attack.]

to make this method prosper the more, if we look at it from all its points of view, and examine it on all sides, by the light of considerable experience. I will therefore proceed to make a few remarks upon the subject.

1. I have formerly mentioned cases in which iridectomy having been successfully performed on *one* eye, the disease appeared in the second eye shortly afterwards. From these cases, which were then very rare, I merely concluded that the arrest of the process in one eye could in no way prevent the transference of the disease to the other, and that, therefore, we ought not to allow the existence of any sympathetic relation between the two affections, but rather say, that they may be referrible to a common cause, acting on each eye, independently of the other. In a few years, however, my observations on these cases multiplied to such a degree, that I ascertained, and can uphold the fact, that iridectomy, when performed upon one eye, may tend, under certain circumstances, to accelerate the process of disease in the other. The grounds upon which I make this assertion are as follows:—

Out of all the cases on which I have operated when in the first stage of glaucoma, there are 43, in which the second eye was, at the time of operation, either quite untouched by disease, or else in the premonitory stage. In 9 cases out of the 43, the second eye was attacked by violent glaucomatous inflammation four weeks after the beginning of the disease in the first eye, and a fortnight after the operation. According to this we see that the second eye has been attacked quickly in more than one-fifth of the cases; this is very different to what we have observed in case of no operation. Generally in cases of inflammatory glaucoma, such rapid succession is exceptional, as I only recollect five cases in my practice where I had not performed iridectomy, in which the second eye was attacked before the end of a month.* By means of questions put to the many incurable patients who came to me with complete inflammatory glaucoma, I ascertained that the succession of the second eye took place, with few exceptions, many months, or even years, later. This agrees with the opinion of most of those of my colleagues, who have directed their attention to the point in question. Although not able to make an exact statement, I know that those five cases, in which rapid succession took place without operation, are taken from a total of eighty patients, whom I had seen during their first glaucomatous attacks. This disproportion is so remarkable, that we can hardly attribute it to mere accident.

* N.B.—A case of this kind, instructive, moreover, in other ways, has lately been mentioned by Pagenstecher and Saimisch (*Clinische Beobachtungen aus der Augenheilanstalt zu Wiesbaden*, first vol., p. 31-34; *Clinical Observations at the Ophthal. Institute, Wiesbaden*).

It will aid the comprehension of the circumstances, under which iridectomy may have accelerated the succession in the second eye, if we remember that that eye evinced precursory symptoms, in seven out of the nine cases of rapid succession above-mentioned, so that in two only was it quite intact; while in the total of forty-three cases before cited, there were *twenty-four* in which the second eye was quite sound. Judging by this, we should say, that the acceleration of succession is most peculiar to those cases of acute glaucoma in which the second eye shows commencing symptoms; if the eye, however, is sound, we had better not decide for certain, on account of the small number of cases in point, and because the disproportion is not so marked, for in the first instance, it is one to twelve, in the last, more than one to three. According to this, the subduing of the glaucoma in the one eye may promote, under certain circumstances, the disposition to disease in the second eye, and thus a relation must be supposed (quite the reverse of sympathetic), namely, a tendency to move from one eye to the other. This finds an analogy in other classes of inflammatory diseases of the eye, for instance, in certain forms of keratitis.

To avoid any misunderstanding, I must remind you that the aforesaid refers only to the use of iridectomy in the first stages of inflammatory glaucoma, for I have observed nothing which would authorise me in drawing a like conclusion with regard to its later periods, on the contrary, I am still of opinion that the degeneracy of a glaucomatous eye (especially the ectasias, which are accompanied by violent ciliaralgia or intraocular bleedings), disposes the second eye to the disease, in a degree difficult to be ascertained, though certainly over-estimated by many, and that, therefore, it will be found better for the second eye to arrest the process on the first eye by some means or other. These facts need not prevent an intelligent practitioner from making use of iridectomy in cases of acute glaucoma, but only serve to recommend to him some degree of prognostic circumspection. When I operate on patients for acute glaucoma, I always inform them of the possibility of the disease speedily attacking the second eye, so that if this actually happens, they are not taken by surprise, but sometimes even welcome gladly the acceleration of the second operation, of which they have already experienced the success on the first eye.*

* [My own experience mainly accords with this. Iridectomy has appeared to me to excite the other eye chiefly where this other was already inclined to inflame; where, with acute glaucoma in the operated eye, its fellow evinced doubtful increase of tension (T 1?), or some conjunctival or ciliary injection. Hence, in such cases, unusual care should be observed during the convalescence to avoid too early or too sudden exposure to light, or return to work, especially if there be photophobia, or any manifest irritability. Much will probably depend on the course taken by the wound; the sooner and the more smoothly it heals, the less the risk. I have always

2. Numerous observations have been addressed to me by some of my colleagues, concerning the *formation of cataract*, after the operation for glaucoma. Now the question naturally arising is this; is cataract brought on solely by the opening of the capsule, from an imperfect operation, or can it form without this cause? A certain disposition to cataract is peculiar to glaucoma, and we cannot deny the fact, that, were once such a tendency to gain ground, it might be increased and hastened by the renewal of the humour, and the attack on the circulating system of the eye. Indeed, I have observed, in cases of immature cataract, when I performed iridectomy preparatory to extraction, that the cataract matured very rapidly, though the capsule had not been wounded.

In deciding this question, we abstain from all theories and inferences, and judge merely from the results of practical experience. Among more than 400 cases, upon which I have operated for glaucoma, I saw only *one eye** in which cataract formed immediately after the operation, and in this case the capsule had been hurt (owing to the excessive unruliness of the patient), as was proved to a certainty on an after-examination. In a few cases (say three or four) upon which I have operated, in the later stage of glaucoma, cataract has developed itself in course of years, but as, for months after the operation, the lens-system was perfectly sound, and the type of formation resembled the cataract of old age, there was no reason to think that it was the consequence of the operation. On the other hand, I have observed in a considerable proportion of cases of chronic glaucoma, when I have operated during considerable dulness of the lens, that cataract was much more rapidly developed after the operation than before. This agrees with my experience above-mentioned, of simple immature cataract.

It has sometimes fallen to me to extract matured cataract at

regarded whatever tendency iridectomy may have to excite sympathetic disturbance in the opposite eye to belong to it as to any mere wound. So far as it is a temporary disturber of the vessels and vascular and sensitive nerves involved, it may rouse sympathetic irritation. In so far as it relieves glaucomatous tension and sets forward the ocular tissues, and especially the internal vessels, on a course of recovery from their diseased state, it can hardly be otherwise than salutary to the fellow eye. So long as glaucoma in one eye is complicated with inflammation, the other eye is more inclined to sympathise, and this inclination lessens as the first affected eye becomes quiet, either by iridectomy or any other cause. The wound of iridectomy itself though attended by a relief of intraocular tension, may sometimes prove a temporary excitant to the other eye, requiring guarded treatment until it becomes quiet. This, however, manifestly constitutes no argument at all against iridectomy, but only for careful management of the convalescence, and for a prudent word of warning to the patient.]

* Of course I am speaking only of uncomplicated glaucoma. In cases where glaucomatous tension has resulted from circular or total posterior synechie, the formation of cataract following on the operation takes place in a far greater degree.

a later period, from eyes attacked with chronic glaucoma. As far as I have observed, not one, of all the eyes upon which I have operated in the first stage of acute glaucoma (the lens being sound), has become cataractous. Many of these patients however suffered in the other eye with consecutive cataract, accelerated by complete or increased glaucoma. Experience, therefore, proves that we are right in this conclusion, viz., that iridectomy, while it subdues the glaucoma, decreases also the disposition to cataract, which is connected with that disease.

Should it ever happen that after a considerable time an eye which has been operated on for acute glaucoma becomes cataractous, we should deny a direct relation between this disease and the iridectomy, because this happens so very rarely, and the cataract did not appear until so long afterwards. Cataract is by no means uncommon at an advanced age, and it may be that the previous glaucomatous process causes a first disturbance of the nutrition of the lens, while as yet no dulness can be traced. Therefore, when, shortly after *iridectomy*, *cataract is formed in a previously sound lens, the cause must be assigned to a solution of continuity of the capsule, and not to the iridectomy.*

We are not, however, bound to maintain that this damage must necessarily have consisted in a direct wounding of the capsule by the instruments inserted into the eye. It is very probable that in consequence of a sudden discharge of humour (which sometimes, in case of glaucomatous tension, spirts out like a fountain), a spontaneous rupture of the capsule might take place. It is partly from fear of this, and partly also to prevent a sudden overfilling of the vessels, that I have always advised that the humour should be allowed to flow out as slowly as possible: this can be effected by laying back the lancet as far as is necessary. I have had patients brought to me who, after they had undergone iridectomy, had marginal cortical opacities, just within the capsule, corresponding to the peripheral part of the artificial pupil, which had formed, as the several operators stated, soon after the operation, while the rest of the lens had remained perfectly clear for years in each case. The opacity was most intense near the equator of the lens, and lost itself in the form of a broad stripe, in the immediate vicinity of the accessory pupil. Not the least irregularity was to be discerned in the anterior capsule. Although this statement does not forbid the supposition of a previous wound, yet the time, place, and stationary character of the opacity impressed me greatly, and I thought that a rupture near the equator might have taken place: it was possible that the rather rapid diminution in the thickness of the capsule at this place, and the sudden projection of this part of the lens-border towards the wound during a rapid discharge of aqueous humour, might dispose to such a

bursting. The fact that the dulness of lens is local only, arises most likely from the communication being only between the outer border of the lens, and Petit's canal. This, however, is but a supposition, and there is much more ground for the idea that the capsule has been hurt by an instrument, than that it has broken spontaneously. [It must be a faulty operation which complicates iridectomy with a direct wound of the capsule. I have, however, seen cataract follow the operation, from pressure exerted on the lens through the cornea, in endeavours to press out blood that has flowed into the anterior chamber, and so disguised the steps of the operation. If this latter inconvenience arises it is sufficient to open the lips of the incision, while gentle pressure or traction is made on the globe. I have several times performed iridectomy for glaucoma occurring *in the course of cataract*, and on several occasions have ascertained positively that there was no acceleration of the cataract, sometimes I have thought a retardation of it. On one occasion I purposely pricked the capsule in three or four places after excising the iris—my object being to render an incomplete cataract mature at an earlier period—but it had no effect beyond leaving specks of opacity where the needle had penetrated, and at the end of a year the rest of the lens was no more opaque than before.]

To secure the exact performance of the steps of the operation, especially in cases where the anterior chamber is very shallow, and the pupil widely dilated, I consider a bold *fixation* of the globe (which is best performed with a simple hook forceps) to be absolutely necessary. Although I, for my part, always follow the principle of fixation in all operations on the eye, yet I can quite understand the objections raised against it by some when applied to certain cases, especially that of extraction by flap. Here the question may be looked at from two points, and the decision arrived at, be two-fold. There can be no doubt, however, as to the advantage of fixation in operation for glaucoma. The space allowed for the play of the instrument is often very limited, because we ought to make a point of excising the iris in proper breadth up to the ciliary insertion, and, therefore, to make the inner wound quite at the rim of the chamber,* but

* My colleagues are now quite agreed as to the importance of this rule in glaucoma, and Arlt has lately been urgent upon it with good reason. I have treated this mode as opposed to common iridectomy in my first publication on the subject (note sur la guérison du glaucome adressé à l'Institut de France), and also in the Archiv. (Bd. III. 2, page 548-549). At the same time I must confess that I have known many operations for acute glaucoma to be successful, although the excision was not performed in the prescribed manner. But, as in other cases where the glaucoma was of longer standing, the result, under the same circumstances, was unsuccessful, so as to render the repetition of the iridectomy necessary, the rule of fixation has been established, and is of great importance, especially in chronic glaucoma, and in later stages of acute glaucoma.

still without endangering the lens capsule. This is very precarious if the globe is at all unsteady, and indeed is considered difficult even by the most skilful operators. The fixation of the globe affords greater safety in other respects, however, for instance, in the discharge of the humour. It is only possible with a perfectly steady globe, to lay back the lancet-knife skilfully during the gradual escape, so as in some measure to prevent a sudden gush.

I will now return, in a few words, to the subject of the *direction of the iridectomy*. Where cosmetics are to be considered, I proposed, as also did Bowman, independently of me, that iridectomy should be performed upwards. Moreover, as regards optics, we ought to form the opening upwards, because the irregularly refracted light has, in that case, the least chance of penetrating; besides, the useful pupillary space and the circles of diffusion beyond the limits of accommodation are enlarged to the least extent by this mode of operating. I should not, however, urge the adoption of this direction for the pupil, unless I had reason for it in the particular case, as it is decidedly more difficult of execution, especially in cases where the anterior chamber is very shallow, the iris reduced to a narrow circle, and the eye itself very restless. If, when the eyelids are forced apart, the contractions of the orbicularis offer any resistance, however fruitlessly, the globe always has a tendency to escape upwards, and the compression acting upon it becomes naturally stronger, if the hook forceps roll the globe downwards in opposition to this tendency. If this resistance renders the operator's hand unsteady, so that he does not drag the globe down low enough, he is very likely to fail in attaining that position, in which alone proper command over the instrument is possible, and either the knife does not enter the chamber at its rim, or else it endangers the lens-capsule, by not entering slanting enough. If, on the other hand, the globe is pulled down in the proper manner, the operation will most likely be got through with safety, though at the same time the amount of compression causes the humour to discharge with violence, a fact which deserves consideration.* The appearance of the pupil need not be considered in the greater number of patients, on account of their advanced age, and the optical question is also of little consequence, when compared with the chance of risking the general result of the operation. Indeed, the importance of these points in many cases disappears altogether, on account of the incurable degree of blindness present. As a rule I should advise the substitution

* The hyperæmias occurring on the sudden decrease of tension are very serious in glaucoma. It is not so much the violent hæmorrhage into the anterior chamber as the wide-spread retinal ecchymoses, which creates anxiety. I have seen the latter very conspicuous in acute cases, where the humour discharged itself very violently.

of the *inward* direction for the upward, especially in case of incompetent assistants, if the disease presents many difficulties, or if you yourself have had little practice. You are more likely by this means to avoid wounding the capsule. The reason why I revert to this point, is that excision upwards is frequently practised, abroad especially. [I venture to advocate the upward iridectomy *as the rule* on account, 1, of the better appearance afterwards; 2, on optical grounds; 3, on account of the cicatrix being in a better situation under such contingencies as are noticed in the following section. The objections to it on the score of greater difficulty of performance hardly apply when chloroform is exhibited. If, however, the operator is inexperienced, he may make the horizontal iridectomy better than the vertical.]

3. There is a peculiar form of cicatrization of the wound after iridectomy has been performed upon glaucomatous eyes, and to this I have for some time directed my attention. Although in general one does not find any scar at all, or at any rate, only a very narrow, close, homogeneous scar-substance, after linear incisions made by a lancet or cataract-knife, it certainly is the case that in one series of glaucomatous eyes, the edges of the wound do not meet, and a kind of web is formed, which remains for some time imperfectly closed, and is subject to bulge. When closely examined through a lens, you discover some rather thick scar-fibres stretched in a diagonal direction across the slit of the wound, the interstices being filled up by a thin transparent membranous substance. This substance gives way to the intra-ocular pressure, and is forced through between these strings, thus dividing the slit into divers transparent blister-like prominences. Generally this substance is periodically broken through, the aqueous humour enters under the conjunctiva, and so forms a serous elevation of the latter from the episclera. This may happen many months after the operation, indeed I have known cases, in which, two years after the iridectomy, the aqueous humour flowed into the sub-conjunctive tissue, and possibly also through the thin membranous substance. The eyes affected remain generally unnaturally soft, but the anterior chamber has about its usual contents.*

It must not be thought that this form of cicatrix, which for shortness' sake, I will call "*cystoid*," is connected with any reaction after the operation. When the eye is examined, a week

* A little attention will suffice to distinguish this form of cicatrix from that which ensues when the iris is only partially removed. I have already protested against this mode of proceeding, though I know it to be much in favour with some. We are not here talking of the vesicular intervening substance, but of a little prolapse of the iris, which is often separated by the cicatricial fibres; then the aqueous humour does not filter through for so long, because the iris tissue grows so rapidly, as to be forced into the track of the wound, and so stops it up.

or ten days after the iridectomy, there is hardly anything about the wound worthy of notice, but it first shows itself at a later period, when the patient leaves the hospital, and when the natural force of tension begins to act more strongly. Such cystoid scars may afterwards become the cause of disagreeable accidents, as I shall presently explain. I have noted this formation of cicatrix, in its higher and typical development, in about $\frac{1}{15}$, and in its lower degree, in more than $\frac{1}{5}$ of the eyes operated on for glaucoma. It generally appears in those cases in which symptoms of increased tension were very marked before the operation, and also when glaucomatous excavation of the optic nerve is added to previous scleræctasia posterior. I soon ascertained that this anomaly stood in causal relation to the increase of tension, in such a way that the increased pressure would in some measure derange the usual condensation of the cicatricial tissue, and be followed by bulging. I could not suppose it to depend solely on the sclerotica having been involved, for I incise this part in making all marginal artificial pupils, while among many hundreds of cases I have observed this form of cicatrix only where there has been glaucomatous tension. It does not appear either with small scleral wounds in healthy eyes, if a little attention is given to them while the wound is healing. It must be allowed, however, that when the incision is made through the cornea, such an anomalous formation of scar is not observed, and that, therefore, the scleral puncture is the *causa sine quâ non*, if not the *causa efficiens*. We need not be surprised at this, when we consider the great difference between the healing process in the cornea, and that in the sclerotica, as regards manner and speed. Were this cystoid cicatrization universal, it might aid us in coming to a conclusion concerning the *modus operandi* of iridectomy. The continued escape of the aqueous humour through the scar-tissue might lessen the tension in the same way as a corneal fistula. But as in the greater number of operation cases, no such peculiarities in the scar-tissue are discoverable, and as, on the other hand, the process of healing in cases of cystoid scar-formation offers no advantages over those of the ordinary process, we find it impossible to come to a decision, and, in spite of the many suppositions which have been raised concerning it, the theoretical part of the question has not yet been solved. One thing is certain, that the slow filtering of the aqueous humour causes a greater decrease of tension than we could possibly obtain by the common process of healing. A mere touch of the globe gives proof of this. It is true, at the same time, however, that in by far the greater number of cases, there is no necessity for such a great decrease, and the usual degree is sufficient. It is a question, whether in some cases of chronic glaucoma, with exceedingly hard globe, a natural process is not to be perceived in

the cystoid formation of scar; this, however, I leave undecided. In the lesser degree of cystoid formation of scar, the web between the strings became closer in most cases some months after the operation; with this the flow of aqueous humour under the conjunctiva ceased, the slight bulge decreased, and the result was a moderately normal closing of the wound. The eyes in question showed slight symptoms of conjunctive and sub-conjunctive irritation, with regard especially to the wounded part, but no serious disturbance arose therefrom. With the higher degrees, however, it was different. In most cases everything remained unchanged for six months, a year, or still longer, or the ectasia even increased in circumference. In some cases the eyes suffered during the whole time from conjunctival injections, and were sensitive to external injuries. The closing substance did not thicken until after the period above-named. I have lately seen cases which have been very much aggravated by a bulging cicatricial tissue, and, if the irritation is not properly attended to, it may go on to suppuration. With increasing sub-conjunctival swelling, and a variable amount of pain, the part affected assumes a yellowish tint, hypopyon occurs, then secondary suppurative iritis passing sometimes even into panophthalmitis.

A master turner, of Berlin, about 50 years old, had lost one eye through a reclinacion nearly thirty years before, while the second eye had become weaker by degrees, and evinced symptoms of chronic glaucoma, with commencing dulness of lens. I performed iridectomy, and the result was, first, a cessation of this, and subsequently an improvement in the sight, but the wound scarred over in the manner described. Nine months after the operation, the aqueous humour was still filtering under the conjunctiva, and the globe was soft. One year after the operation, the patient who, contrary to my advice, had till then neglected to come to me, came to the "Polyclinic" with all the symptoms of a diffuse, purulent, iridokeratitis, proceeding from the wound-substance. This latter was yellow, the iris also presented a yellowish discolouration, and was swollen; and there was severe chemosis, of that peculiar pale yellow appearance, which is so characteristic of commencing panophthalmitis. The total destruction of the eye was, of course, inevitable. This is, however, the only eye which I have seen destroyed by secondary occurrences, in case of cystoid scar; and most likely this one might have been saved by proper treatment. Two other cases were rendered critical, through local suppuration of the scar, one six months, the other nine months, after the operation. Though there was strongly-marked purulent iritis in these cases, they were both saved, by means of luke-warm poultices, alternately with compressive bandages, atropine drops, and once, a rapid mercurialization. In a fourth case, the conjunctival irritability which followed each discharge of humour, became so

troublesome to the patient, that I thought it necessary to put a stop to it, by taking off the projecting substance. These, and a number of other cases which I might quote, go to prove that this form of scar presents very decided disadvantages, but only problematic advantages, and that, therefore, it is desirable that it should be counteracted.

I wish to draw attention to the following remarks:—

(a.) Those eyes which have a tendency to cystoid-scar formation (which tendency is marked at first by the more protracted discharge of aqueous humour under the conjunctiva, while the symptoms of the intervening substance develop themselves later) must be guarded for a much longer time than other eyes from external injuries, especially against the effects of tension; and they must be subjected to a periodical compression.

(b.) A light compressive bandage, applied for the first three or four days after the operation, is generally found useful as a prophylactic.

(c.) If the form of scar is marked in any high degree, the question is whether or not it may become troublesome. In the latter case, I advise that it should not be counteracted, but that the patient should be carefully watched, so that all possible dangers may be averted in time. In the other case I should recommend a healing of the wound by artificial means. I must here warn you against the application of caustics; as, though it is true, that if used in very great moderation, inflammation need not necessarily follow, yet a stronger application might very often bring on serious irritation, caused by diffusion of the caustic. The best method is the following:—The globe being well fixed, take off the bulging substance with a narrow pointed knife, as in a small prolapsus iridis, so that after the opening and collapse of the membrane, the cut is finished with the scissors. Even after this little operation, great care is necessary, a light compressive bandage must be put on, and several days of strict quiet be procured for the patient; otherwise an inter-substance, inclining to bulge, may again be formed. At the same time I believe that time, and the removal of the glaucomatous tension, will do much to lessen this tendency.

(d.) When once suppuration has set in, the best time for ablation is over, as the injury and access of air only hastens the suppuration. The best method of effecting a cure is this:—Use luke-warm poultices alone at first, then alternately with compressive bandage, drop in atropine, and in case of purulent iritis, try rapid mercurialization. (Every two hours a friction of $\frac{1}{2}$ scr. mercury ointment, with $\frac{1}{2}$ —1 gr. calomel, until the commencement of salivation.) We are justified in putting the question, whether, in this undesirable scar formation, which always causes, in some per cent. of the cases, irritable disturbance of one kind or other, we ought not to give up the

puncture of the sclera, and adopt that of the horny tunicle. I have already stated, that the direct cause is the dominant increase of pressure, the necessary medium is the peculiar manner of healing of the sclera wound. A skilful operator may attain the desirable peripheric situation of the inner wound, by inserting the knife in an abrupt direction on the edge of the cornea, and by laying it back in a slanting direction as soon as it has penetrated into the inner chamber. But if, on account of a high bridged nose and flat anterior chamber, it is necessary that the operation inwards be performed with very curved instruments, we are not so certain of success, and in the fear of entering the wound too abruptly, we may make the incision too far within the corneal margin. As this point is worth consideration, and as by careful after-treatment the evil effects of a possibly bad formation of scar, may be very much diminished, I do not, in the greater number of cases, wish to give up my formerly advocated place for puncture, one millimetre away from the edge of the cornea.

[*Cystoid cicatrix*.—This is highly deserving of attention, as it is not uncommon after iridectomy for glaucoma. I have seen it chiefly where, from long existing tension preceding the operation, the sclerotica may be supposed to have lost much of its natural elasticity, and where a slight excess of secretion and consequent tendency to tension after iridectomy may be peculiarly apt to act on the new material of the scar, and to stretch it. Undoubtedly it does not occur after wounds involving the cornea only, and hence if the marginal iridectomy could be as effectually performed *per corneam* as *per scleroticam*, the former might be preferable. I have made some attempts in this direction, but this is not the place to describe them. I am also not certain that in some instances at least the distension and thinning of the scar may not in the end prevent the injurious consequences of tension by providing an elastic yielding place. It is certain that even after the most perfect iridectomy the globe has sometimes a tendency to tension, mounting even to T 1, a degree so much less than that which preceded the operation, that the internal tissues tolerate it, and the glaucoma remains arrested. It is in such instances that I have mostly witnessed the cystoid scar, and have regarded it as probably useful as a sort of safety valve. Generally, however, even with the cystoid scar, the tension has long remained somewhat in excess (T 1); and contrary to von Graefe's observations above, I have hardly ever found the tension less than normal (—T 1), even when the vesicle was very large and thin, and had existed for a long time. I have thought that in such instances the distension had gone on gradually to such an extent that at length, as in conical cornea, it came to offer much less resistance to the escape of aqueous humour than at first, and so the tension was brought to an equilibrium.

Probably it often happens that by degrees the tendency to over-secretion itself lessens. I have not seen the vesicle discharging itself by an open orifice; nor has it been the seat of any serious inflammation, far less the starting point of Ophthalmitis, which I should regard as quite an exceptional and as it were an accidental complication. I have on some few occasions treated the pellucid vesicular cicatrix by fine puncture with a broad cutting needle, repeated at more or less frequent intervals, and this practice I can recommend where there is any appearance of an obstinate return of tension. The puncture should be effected without pain or irritation, and without wound of any vessel, and the surgeon should see a little trickling away of the aqueous humour. Occasionally, in simple and subacute glaucoma, a temporary augmentation of tension (T 1 or T 2) from some passing cause recurs some time after iridectomy had apparently quite allayed the disease. Such tension is often harmless, and disappears under simple treatment, but occasionally it seems more threatening, and is attended by a little congestion and by ciliary pains. I have found it yield to a single puncture of a cystoid cicatrix, or to a repetition of punctures. The cystoid cicatrix evidently afforded a ready vent of a salutary kind, while it had probably itself resulted from some unusual tendency to return of tension in the particular case.

I can call to mind two, if not more, instances in which, after operation for cataract performed without any idea of glaucomatous complication, the cicatrix gradually assumed, in a marked degree, the cystoid character. Several years after the operation, when these patients were last seen, the vision remained good. I believe a tendency to glaucomatous tension had been the cause of these bulging cicatrices, and had been also prevented by their formation from injuriously affecting the internal tissues.]

[To be continued.]

OBSERVATIONS ON THE DISEASES OF THE CORNEA AND CONJUNCTIVA.

By DR. H. SNELLEN.

ABRIDGED AND TRANSLATED BY THOS. WINDSOR.

No affections of the eye are more common: of 989 patients of the Dutch Ophthalmic Hospital, from November 6, 1858, to December 30, 1859, 677 had some disease of these parts.

Nomenclature: in former times the diseases of the eye were

distinguished, and at the same time named, according to their causes and course; now an anatomic-pathological diagnosis is necessary. When the patients first present themselves, I form a diagnosis from the objective symptoms; and afterwards at some later period fill up and define the clinical ideal, by comparing the objective symptoms, with the anamnesis, course, and effects of treatment. Both the clinical denomination and the anatomic-physiological diagnosis are necessary; trachoma in its third stage would generally signify much the same as "atrophia conjunctivæ with trichiasis," yet the former name would declare besides, that this state had been caused by trachoma, and not by cauterisation, granular conjunctivitis, or blepharitis. I primarily distribute the conjunctival diseases according to the anatomical changes; secondarily, according to the character of the discharge; and finally, according to the previous duration. As a series of the more commons forms, we have—

Conjunctivitis simplex			
"	granulosa	} mucipora, muco-purulenta, purulenta, exsiccous.	} incipiens, provecta, inveterata, recidiva.
"	diphtheritica		
"	vesiculosa		
"	cicatricosa		
"	tabescens		
"	xerosa		
"	phlyctænulosa		

Besides—

Chemosis conjunctivæ
Cicatrices "
Atrophia "
Symblepharon "
Blepharophimosis, &c.

And of the Cornea we have—

Keratitis vasculosa			
"	pannosa	} spontanea, consecutiva.	} incipiens, provecta, inveterata, recidiva.
"	parenchymatosa		
"	malacia (gangrænosa)		
"	phlyctænulosa		
"	ulcerosa		
"	" perforans		
"	" cum hypopio		

Besides—

Macula corneæ
Staphyloma corneæ, &c.

These pathologico-anatomical deviations form, by being combined with one another, or by following one another, definite

forms of disease, which may be generally called ophthalmiæ, and which may be further defined by appending some word denoting the most prominent symptom, or of common use.

Ophthalmia catarrhalis
 „ purulenta
 „ „ neonatorum
 „ granulosa
 „ trachomatosa
 Xerophthalmia
 Ophthalmia scrophulosa
 „ exanthematica (febrilis)
 „ traumatica
 Panophthalmia.

OPHTHALMIA CATARRHALIS.

Conjunctivitis simplex mucipara, generally incipiens, chemosis, in rare cases keratitis vasculosa, sometimes very superficial keratitis parenchymatosa, often accompanied by general catarrh.

243 cases: general duration 1—21 days; in general, we may say that it may be cured in as many days as it has already existed; if not cured, it often passes into ophthalmia granulosa.

Even in slight cases, the most rapid, certain, and perfect recoveries are obtained, by applying the solution of nitrate of silver to the inner surface of the lids, and after a few seconds, washing them with water. The strength of the solution should vary according to the violence of the inflammation: 1 gr. ad ʒj is the one ordinarily required.* According to a series of experiments, the nitrate of cobalt (grs. ij ad ʒ used as drops) appeared to act exactly like the sulphate of zinc, whilst the neutral acetate of lead was specially distinguished, by the little pain it caused.

OPHTHALMIA GRANULOSA.

Conjunctivitis granulosa mucipara, sometimes muco-purulenta, at a later period with keratitis vasculosa.

74 cases, of which, 48 were already affected with keratitis.

I should say that granular ophthalmia should not be considered as a specific form; any conjunctivitis mucipara may degenerate into it.

* On this method of applying Arg. Nit., vide the remarks of Professor V. Graefe in his paper "On Diphtheritic Conjunctivitis," in the Archiv. für Ophthalm. B. I., translated in the London Medical Review, Vol. I.—I. W.

Treatment: Nit Arg. in solution, gr. X ad ʒj, or in the more violent cases, 40 gr. That it may be well washed off (with simple water), and so the cornea spared, a little trough is placed under the patient's eye; into this runs the water which is freely applied to the eyelids, by means of a large brush.

OPHTHALMIA TRACHOMATOSA.

Conjunctivitis vesiculosa, afterwards cicatricosa, trichiasis, entropion, keratitis, very chronic course.

For the first few months, patients, affected with trachoma, are little conscious of their disease. On the inner surface of the eyelids we find, especially high up where the conjunctiva is reflected (fornix conjunctivæ), little clear vesicles of the size, and much the appearance of soaked sago-grains. They gradually increase in number, so that at last we find the whole superficies of the fornix covered with them (conjunctivitis vesiculosa).

In the second stage, these vesicles, to a great extent, pass away, and in their place, are found small exudations, which, by running into one another, form stripy patches (conjunctivitis cicatricosa).

After 2—4 years, the whole conjunctiva is affected with these stripy exudations, which often cause hard, deep cicatrices, mostly parallel with the edge of the lid.

The subconjunctival tissue gradually participates; the tarsus becomes thickened and changed in form. In this way occur, firstly obliteration of the limbus palpebræ; then trichiasis, and finally, after ten or twelve years, entropion.

The treatment is the same as that of granular ophthalmia; the keratitis occurring in combination with atrophía conjunctivæ, is most successfully treated by irritating the atrophied conjunctiva with strong solutions of Arg. Nit., Cup. Sulph., or even with Ol. Terebinth.; by these means the development of vessels in the cicatricial tissue is promoted, and the tissue itself becomes moister and softer. In trachoma, as indeed in every chronic affection of the conjunctiva, the lachrymal passages become not unfrequently affected, with inflammation of the sac or obstruction of the ducts. I have followed Mr. Bowman's method in their treatment, except that I have used whalebone, instead of silver probes; they are more flexible, and cause much less pain.

OPHTHALMIA SCROPHULOSA.

Conjunctivitis and keratitis phlyctænulosa.

133 cases; mostly children.

Treatment: locally by the instillation of sulphate of atropine, gr. ʒj ad ʒij of water, and once a day touching the inner surface

of the palpetræ with Arg. Nit. gr. j ad Aq. ʒj. Constitutionally by good diet, fresh air, bathing, iron, and Bt. Iod.

I shall describe a special form under the name of

OPHTHALMIA FEBRILIS.

When keratitis occurred in fever patients, or fever attacked those affected with keratitis, I usually saw the morbid process make a rapid advance; deep ulcers, with macerated fundus and irregular margins were formed, &c. Unless actively treated, the whole cornea becomes macerated (keratomalacia); the iris falls forward, and the eye is soon lost.

Treatment: large doses of quinine internally, and irritants to the cornea. As an irritant, I have found turpentine very satisfactory; its action can be moderated by mixing it with olive oil (oleum terebinthinæ mitigatum); whilst it is being employed, atropine should also be applied.

MACULÆ CORNEÆ.

I have found the mitigated turpentine also of great use in this affection.

Staphyloma: in various cases of partial staphyloma, I have seen the cornea replaced (to its natural level) after iridectomy: thus it is an indication, rather than a contra-indication for iridectomy.

ON SUTURE IN ENTROPION.

By DR. H. SNELLEN.

(*From the Report of the Netherlands Ophthalmic Hospital.*)

THE many cases of entropion which have occurred here, especially during the recent extraordinary prevalence of trachoma, of which there has been an epidemic at Vecie-huizen, have afforded us an excellent opportunity of considering and comparing the various methods of operating for its relief. In our opinion, the best ultimate results are obtained by removing a small portion of skin and muscle parallel to the ciliary margin, and when there is great thickening of the tarsus, excising, at the same time, a wedge-shaped strip of the cartilage, or by notching it in a dentated manner, and then uniting the ciliary edge with a higher part of the tarsus by sutures.

When the palpebral aperture is contracted, we are convinced of the great importance of sufficiently enlarging it by the ordi-

nary operation for blepharo-phinosis. In every mode of operating we have been obliged to have recourse to this.

Latterly, we have tried to limit ourselves to the use of sutures alone, and with very favourable results, especially in cases in which the entropion is not too strongly developed. Taking a thread and two needles, we pass both the needles through the whole thickness of the lid, from within outwards, being careful that one needle passes through the upper part of the cartilage, and the other somewhat higher above this structure; the needles are then passed along the outer surface of the cartilage, between it and the muscle, so as to come out at the ciliary margin about two millimetres (?) from each other.

In carrying the thread through the lid the curved needle will be found to answer best, as it is easy to give it the proper direction.

We have now inclosed the upper edge of the tarsal cartilage in a loop; the ciliary margin is next drawn upwards, and the two ends of the thread tied on its outer surface. Two remarks remain to be made on the position of the suture; 1st. It is important to pierce the conjunctiva sufficiently high so that as much of this membrane as possible shall remain between the free edge of the lid and the point of insertion of the needles. 2ndly. It is important that the thread should not come out *below* the ciliary margin, since the small wound leaves a cicatrix which may cause permanent disfigurement of the ciliary border.

Pagenstecher proposes a method of curing entropion by means of sutures. He simply passes a thread through the lid, cartilage and muscle, from top to bottom, and ties it tightly and firmly on the outer surface, allowing it to remain until it has cut through the tissues. The contraction of the outer surface of the lid, obtained by cicatrization, counteracts the introversion which has been also caused by the piercing of the internal surface. Our suture differs entirely from that of Pagenstecher, since it not only acts mechanically, but also draws forward the ciliary margin. Without causing any external scar, it speedily produces the required effect, and is, moreover, free from the continued suppuration which is unavoidable with Pagenstecher's suture. As a rule, we have withdrawn the suture in about three days. Great care should be taken to remove every particle of the thread. We have known a case in which a small piece of the thread was imprudently left in the lid, and a very troublesome suppuration was the consequence during the first week, after which the abscess was laid open, and the piece of thread discovered and removed.

PART III.

Minor Contributions, etc.

PERITOMY.

VASCULAR CORNEA AND GRANULAR LIDS—ONE EYE TREATED BY INOCULATION, THE OTHER BY PERITOMY.

UNDER THE CARE OF MR. LAWSON.

E. R., æt. 19, was admitted into the Ophthalmic Hospital on the 5th July, in the following condition:—

Both lids were extremely granular—the granulations being large and fleshy. Both corneæ were completely vascular and vitious, presenting quite a velvety appearance; no portion of clear healthy cornea remained. She was able to see her way about, but could not discern features or count fingers with either eye, at the time of her admission. She had been long under treatment elsewhere, but so far from improving, says, that lately she had been getting decidedly worse. Her left eye, she thinks, is the worst. On this account the left eye was selected for inoculation, and some pus, from the eye of a child suffering from severe purulent ophthalmia, was introduced between the lids. This was speedily followed by intense inflammation, great pain, and swelling of the lids, accompanied by a copious discharge of pus. She was kept in the hospital, allowed to walk about the ward, and maintained on a good diet, but the action induced by the inoculation was left to run its course, and on the 17th of the month, when the activity of the inflammation had greatly subsided, she was made an out-patient, but there was still a free discharge from the lids and the surface of the eye. She has regularly attended the Hospital, and the condition of the eye continues to improve. The last report is on—

October 26th.—The granulations of the lids have disappeared, and a smooth surface is seen. The cornea is bright and transparent, although certainly not so clear as a perfectly healthy one, which had never suffered from disease. To the eye it appears non-vascular. She is able to read No. 6 of Jaeger's test types, and in a few month's time will probably be able to read No. 4 or No. 2.

On the 10th of October she was readmitted for the treatment

of the right eye. Since her left eye had been treated, her right had continued to get worse, and now with it, she had little more than a mere perception of light. She was unable to recognise features or to count fingers, or, unaided by the left eye, to see her way about.

In this eye peritomy was performed, and a piece of conjunctiva, $\frac{1}{8}$ th of an inch in width, was removed from around the entire circumference of the cornea—care being taken to cut it away close to the corneal edge, and at the same time to dissect off all the sub-conjunctival tissue, which corresponded to the piece of conjunctiva removed.

This proceeding was followed by a considerable amount of pain and a free suppurative inflammation. The lids were puffy, the eye very irritable to light, and there was a moderate discharge of thin semi-purulent matter from between the lids. The conjunctiva was much chemosed. These acute symptoms soon subsided, and in about ten days she was able to leave the Hospital and become an out-patient, but a subacute conjunctivitis remained, and a free discharge of semi-purulent fluid continued to flow. The eye appeared almost as if it were recovering from inoculation. She has been seen at regular intervals since the operation, and no treatment has been adopted to check the discharge from the conjunctival surface of the lids and eye-ball.

December 4th. The discharge still continues to some extent. The sight is decidedly improved. She is just able to count fingers, but, until the present state of irritability has entirely subsided, it is not fair to say what benefit she has derived from the operation. In this patient peritomy produced more acute symptoms than I have ever seen in others on whom it has been performed, but the case was a severe one. The conjunctiva was thick and almost velvety, and the subconjunctival tissue very abundant, and, as a consequence, the action which followed was excessive.

In a case so severe as this one, inoculation by purulent matter is a far more efficient, and, I think, an equally safe proceeding. It is in the milder forms of vascular corneæ, where inoculation cannot be judiciously advised, that peritomy may be of service.

AMAUROSIS.

RECURRENT AMAUROSIS, COMMENCING DURING THE GESTATION OF THE 8TH CHILD, AND RECURRING IN EACH SUCCEEDING PREGNANCY.

UNDER THE CARE OF MR. LAWSON.

B. S., æt. 41, applied to the Hospital on December 2nd of this year, suffering from the following amaurotic symptoms:

She was the mother of nine children, six of whom were now living. She said that in the second month of her pregnancy with her *eighth* child, her sight began to fail her, and continued to get worse until the termination of her pregnancy. She could then only see large objects; she could not count fingers, nor tell a man from a woman; she could merely see that something large was in front of her. After the birth of her child, her sight began to improve, but not until after she had begun regularly to suckle it, and in three months time she was able to read her bible, the print of which was about the size of No. 10 of Jaeger, and she not only could see to do needlework, but actually did it. In this state she continued for two years, when she again became pregnant with her *ninth* child, and her sight, at about the second month, again began to fail her, and continued to diminish, until, at the ninth month, she could see no more than she did at the time of her previous confinement. After the birth of this child, her sight only slightly improved, compared with the improvement which followed the birth of the previous one. This she attributes to the fact of her being unable to suckle her child on account of her bad health. She regained, however, sufficient vision to be able to walk about unguided, and to carry her child with her in the streets, and although she could easily distinguish the faces of her friends, still she had not sufficient sight to be able to read or write. Eighteen months has elapsed, and she is now pregnant with her *TENTH* child. The increased impairment of vision came on about the second month as on the two previous occasions, but her sight has failed her this time much more rapidly, and on this account she applied to the Hospital.

She is now six months advanced in pregnancy, and the following is the condition of her sight:—

Right eye. No perception of light; pupil, fixed and widely dilated.

Left eye. Is unable to count fingers, but at eight inches can just make out the hand; pupil dilated, but with a very slight range of action.

Examined with the Ophthalmoscope. The optic entrance looks small of a bluish pearly white; the arteries appear like mere threads, whilst the veins are very large.

She suffers now, and has suffered during her pregnancies with pain at the top and back of her head. The least noise she says “seems to bewilder her,” and she arises in the morning with headache. She has no loss of power in any of her limbs, but looks thin and haggard, having the appearance of one who has gone through much trouble.

A CASE OF EPITHELIOMA OF THE CONJUNCTIVA.

By EDMUND BOULT, F.R.C.S., *Surgeon to the Bath Eye Infirmary.*

H. A., a poor widow, æt. 52, became an out-patient at the Bath Eye Infirmary, in the spring of this year, suffering from a fungus growth of the conjunctiva of the right eye.

As she did not appear to be benefited by any treatment, either local or constitutional, but the disease seemed rather to be increasing, she was admitted an in-patient on the 23rd of June last, in the hope that better diet and more regular supervision something might be done to alleviate her symptoms; more especially as the left eye showed symptoms of sympathetic irritation.

On admission, the patient presented a suffering, care-worn aspect; the right eye showed the abnormal growth, embracing the whole of the ocular conjunctiva, and also that portion of the conjunctival membrane lining the lower lid; the fungus also was rapidly encroaching on the area of the cornea to which it was attached, and overhung just as chemosis appears, which also it much resembled in colour and in structure. This attachment commenced to have a very serious effect on the tissue of the cornea itself, which appeared hazy as though strangulated. The portion of fungus lining the lower lid was of a much more dense and fibrous character. There was a good deal of shooting, stabbing pain, and the left eye was evidently commencing to suffer very seriously, though there were no signs of abnormal growth in it. The appendages of the eyes were healthy.

There was a chain of enlarged glands (not hard or adherent to the skin) extending behind the angle of the jaw from the parotid down into the submaxillary region. The disease had commenced two years ago, and had gradually spread over the surface of the eye—a source of great discomfort and serious distress to the patient.

As no treatment seemed to be of any avail it was determined to remove the diseased structure. The patient being placed under the influence of chloroform, as a preliminary step, I enlarged the commissure of the lids by dividing the integument at the outer canthus. This was followed by considerable hemorrhage, which necessitated delay, until it ceased. I then attempted to remove the fungus, commencing at the part adherent to the lower segment of the cornea. This, however, was necessary to accomplish effectually, for as quickly as one portion was removed, another seemed to supply its place. This portion of the tissue appeared to be of a fatty character, and intermingled with the areolar tissue of the orbit. But on the inner surface of the

lid, as before mentioned, was more dense, and seemed to arise from a hard fibrous base. It was soon evident that the disease extended round the whole globe, and considering the small chance of regaining a useful eye, the hazy condition of the cornea, the great probability of the fungus being reproduced, and the difficulty of treating it with active escharotics (for fear of producing symblepheron), together with the threatening condition of the other eye, it was determined to remove the globe at once, which was effected without much difficulty; the whole of the abnormal structure was then carefully removed from the orbit, and the inner surface of the lower lid carefully pared with the curved scissors.

The parts healed kindly, and the cavity, apparently healthy, became much contracted; all discharge ceased, and the pain was relieved. The other eye rapidly regained tone and strength. She was discharged in a few days, and as yet she remains in a satisfactory state.

On examining the eye the fungus was found to surround the globe almost entirely, but with the exception of that part attached to the cornea, seemed to be in more intimate relation with the tissue of the orbit than with the globe itself.

My friend, Dr. Coates (Physician to the Bath United Hospital), was so good as to examine the mass under the microscope; and he writes me, that "it contains, or rather consists, of nucleated epithelial, and fusiform cells," and has no doubt of its malignant character.

The conjunctiva is the frequent seat of abnormal growths, both malignant and non-malignant; of the former the melanotic variety is the most common. I have never before seen, nor have I observed, any case of epithelial cornea recorded by other, or alluded to by, systematic writers; certainly, no case has occurred in the practice of this Infirmary during the last 15 years with an average annual number of patients between 500 and 600. I have, therefore, thought it well to place this case on record among the "Ophthalmic Hospital Reports."

CONTRIBUTIONS TO THE PATHOLOGY OF THE EYE.

BY DR. BOLLING A. POPE, OF VIRGINIA.

I.—A CASE OF SCLERECTASIA IN CONSEQUENCE OF SYPHILITIC IRIDO-CHOROIDITIS.

THE examination of the eye which furnished the material for the following notes was made in the summer of 1861, in Würzburg. The eye itself was extirpated by Professor Linhardt, and kindly furnished me by Professor Heinrich Müller.

The patient, who was still in the hospital under treatment for the remaining (right) eye, was a woman, of 34 years of age; who was unmistakably syphilitic. She had suffered much from pain in both eyes, and I was informed by the assistant-surgeon that the left eye had been extirpated for this reason, and because of the injurious effect which it seemed to exert upon the other eye.

Since the operation the pain had ceased in the remaining eye, and Professor Linhardt proposed to perform iridectomy, on account of an opacity of the cornea, and in order to arrest the progress of the inflammation which had already caused partial synechia anterior. In extirpating the eye the optic nerve had been divided closely to the globe.

For examination, the eye was divided by a section through the middle of the cornea, and the optic nerve at its entrance, in such a manner that an upper and outer, and lower and inner half were formed. The section passed near the macula lutea which was with the upper and outer half.

From Fig. 1 it will be seen that the great change in the form of the globe is anterior to its equator. The antero-posterior diameter of the eye, including the thickness of the cornea, and excluding that of the sclerotica, was $25\frac{1}{4}$ m.m. The equatorial diameter, exclusive of the thickness of the sclerotica, was about $23\frac{1}{4}$ m.m. The diameter in the plane of the anterior surface of the ciliary muscle, exclusive of the sclerotica, was about 14 m.m. From the centre of the anterior surface of the cornea to that of the lens the distance was about 6 m.m. The lens was $3\frac{1}{2}$ m.m. thick, and in its equatorial diameter 8 m.m. The ciliary processes were stretched, sharp, and directed obliquely backwards. The ends of the processes were from $\frac{3}{4}$ to $1\frac{1}{4}$ m.m. distant from the equator of the lens. From the points of the ciliary processes to the sclerotica the distance was about 2 m.m. The distance from the anterior surface of the ciliary body to the edge or border of the cornea, was at least 2 m.m.; and it was here that the sclerotica was most thinned, with here and there a small circumscribed staphyloma. The ciliary muscle, as might be supposed, was stretched and flattened. The anterior chamber had entirely disappeared, the iris and false membrane, which filled the pupil, covering the whole posterior surface of the cornea, and being tolerably closely attached to it. The posterior edge of the section through the cornea was irregular (wavy), caused partly by irregularities in the cornea itself, and partly by the irregularities in the false membrane and iris. Several large vessels ran superficially towards the centre of the cornea. The cornea proper presented to the naked eye nothing for special observation, which was also true of the vitreous humour. The papilla nervi optici, for the naked eye, was excavated. The retina presented nothing for special observation. The choroid appeared to be normal, except that for a space of about 4 m.m.

backwards from the ora serrata the pigment epithelium remained quite firmly attached, while it had elsewhere, in consequence of the manipulation of the membrane, totally disappeared.

Microscopic Examination.

The outer epithelial layer of the cornea was present and showed no very marked change. A superficial network of vessels lay immediately beneath this layer, anastomosing at the border of the cornea with large branches from the sclerotica. The membrane of Bowman was nowhere to be recognized as continuous, appearing only here and there, and then sinking at an acute angle, and disappearing in the corneal substance, as though new layers had been introduced between this and the epithelial layer. The laminated form of the corneal substance was retained, and it remained tolerably transparent. At many points, especially towards the border of the cornea, there was a development of cells which seemed to occupy the place of the corneal bodies (corneal cells), and were probably produced by a proliferation of these. This was most marked in the outer layers, and where the iris lay upon the cornea. In the substance of the cornea proper were to be seen, upon vertical sections, masses of cells which had the appearance of blood-corpuscles. These masses were generally elongated and parallel to the corneal layers and mostly of a dull, reddish hue, and were in all probability sections through newly formed and forming blood-vessels. The vertical sections were made to include the iris and the false membrane filling the pupil. The membrane of Decemet seemed at times to be wanting; at others, especially where the false membrane lay upon the cornea, it was thrown into waves, which, at times, seemed composed of two membranes, with or without a layer of intermediate tissue. This may be explained by the irregularity of the posterior surface of the cornea, and the shrinking of the iris and false membrane. It is also possible that the shrinking (atrophy) of these two membranes may have partially loosened the membrane of Decemet from the cornea.

No trace of the epithelium lining this membrane was to be found. At one point the iris, not far from its pupillary margin, seemed to loose itself in the substance of the cornea, which was here indented. From this point sprang what seemed to be a bundle of vessels full of blood-corpuscles. These ran at a large angle to the corneal layers towards the outer surface of the cornea, only, however, reaching about one-half of its thickness. So great was the quantity of blood-corpuscles that the first impression upon observing them was that a hemorrhage had taken place at this point. In the neighbourhood of the vessels, in the corneal substance, were cells containing very black pigment.

The ciliary muscle was flattened and atrophied; its anterior attachment was stretched and hardly discoverable; and the canal of Schlemm obliterated. The posterior extremity of the muscle contained large numbers of cells.

Very little of the supra-choroidæ remained attached to the sclerotica. The examination of this layer showed the existence, here and there, of masses of cells, similar to pus cells, of various sizes; cells such as are found in connective tissue, generally united by their prolongations; and masses of small, delicate, oval, finely granular cells, which seemed to separate in layers, imbedded in a quantity of the finest fibres, which seemed to connect them together. In the middle layer of the choroid cell-proliferation was observable, especially around the vessels in what seemed to be their external coat (which Heinrich Müller thinks to be muscular), and in the tissue immediately surrounding it. This tendency to increased proliferation in the neighbourhood of the vessels was also observable, in some instances, in the case of the nerve stems. Diffused in the vascular layer, especially next the capillary layer, were large members of round, flat, brilliant cells, with a large round nucleus. These cells were first described, as far as I know, by Heinrich Müller, who observed them in a case affected with morbus brightii, and described them as "cells with jagged cavities." This tendency of the nucleus to become jagged was here only exceptionally observed. At that part of the choroidea, where the pigment epithelium was attached with abnormal firmness, there was a diffuse development of these cells, mixed with a still larger number of those, resembling pus cells. The latter were found also in considerable numbers as far forwards as the posterior portion of the ciliary muscle. Throughout the whole extent of the choroid the intra-capillary spaces continued more than the normal quantity of cells. The volume of the capillaries was often diminished by the enlargement of the nuclei in their walls, or by cell-development in the intra-capillary spaces. The pigment cells of the choroideal stroma were normal. That portion of the pigment epithelium, which was attached with abnormal firmness, was altered in size and form, and the contained pigment was irregularly distributed.

As above stated, the papilla nervi optici was excavated. The inter-granular layer was, in the region of the macular lutea, wavy and shiny, and had the appearance of connective tissue. The rods and bulbs seemed here also smaller than normal. Otherwise the retina presented nothing for special remark.

Blood corpuscles were diffused throughout the whole vitreous body, but were especially abundant near and upon the posterior surface of the ciliary body. There was an abundance of cells observable, often in a state of proliferation, and connected together by their prolongations. In the anterior and most altered portions of the vitreous body cells were observed, exceptionally,

which had very much the appearance of cartilage cells. There its substance was much changed, and often presented a glassy, striated appearance. No blood-vessels were observable in its substance. Anterior to the ora serrata it was firmly attached. Observed at this part after separation, it presented a network of glassy fibres, which formed a narrow band, passing circularly around its outer surface. It seemed, at times, as though a pale, delicate, tessellated epithelium existed upon the inner surface of the hyaloid membrane. These bodies did not seem to contain nuclei, forming, at times masses and at others a single layer.

The order of the principal changes in the membranes of the eye was probably the following. The iritis resulted in synechia posterior and occlusion of the pupil. Fluid accumulation now took place in the posterior chamber, resulting in the pushing forwards of the iris which, under the supposed conditions, must first have come in contact with the cornea towards its great circumference. The fluid increasing, broke up the attachment of the false membrane to the capsule of the lens. The anterior chamber, gradually diminishing, at last disappeared; and as a consequence the iris and false membrane were in contact with the posterior surface of the cornea. The inflammation in the ciliary portion of the choroid, and iris caused the tissue of the sclerotica, in its anterior portion, to become more distensible. This distension of the sclerotica, together with the pressure exerted by the fluid accumulating in the posterior chamber, caused the observed changes in the form and relative position of the lens, the ciliary body, and processes. It is highly probable that the tension of the eye was, at least at the period previous to that, of increased distensibility of the sclerotica, greater than normal; and that this sufficiently explains the condition of the papilla nervi optici. The inflammation of the iris and choroid, the increased tension of the eye as a whole, and the tension of the iris and ciliary muscle will sufficiently explain the hemorrhage into the vitreous body, without supposing that new vessels were formed in it which emptied themselves, and subsequently became atrophied.

II.—THE NERVES AND NERVE-CELLS OF THE CHOROIDEA AND THEIR PROBABLE PROLIFERATION IN THE CASE JUST DESCRIBED.

This eye was well adapted to the investigation of the nerves of the choroid, having been placed in the conservative and hardening fluid immediately after extirpation, and kept sufficiently long to harden all the tissues, so that thin layers of the choroid could be easily obtained for examination. Besides, the pigment cells of the stroma were not very rich in pigment.

Heinrich Müller first discovered the existence of nerve cells and nerve plaques in the choroid. His attention had also been attracted, in one case, to what seemed to be an unusual number of nuclei in the nerve bands or stems of the choroid. Subsequently Dr. Schweiger examined the subject of the nerve cells of the choroid, and published the results in "*Graefe's Archives*;" in which, however, there was no question as to an abnormal condition, though he states that cases of chronic disease of the choroid are better adapted to the study of the nerve cells, on account of the easier preparation of the choroid for microscopic examination in such cases.

In the course of the ciliary nerves between the sclerotica and the choroid, I found isolated bipolar cells, small in size, and quite elongated. These I found in trunks which contained, as far as I could ascertain, only nerve-fibres of double contour, and seemed to be an enlargement of the axis cylinder, containing a nucleus, such as is found in the nerve cells elsewhere. Professor Müller showed me a preparation, however, in which these nerve-cells were in groups. In one of his preparations, made from one of the ciliary trunks at its passage through the sclerotica, there was quite a large group of ganglion cells, each being inclosed in a thick capsule, which contained the usual nuclei. After the entrance of the ciliary nerves into the ciliary ligament, the nerve-fibres, with a double contour, often presented varicosities, which simulated the appearance of a cell and nucleus—a fact first mentioned by Heinrich Müller. A few multipolar ganglion cells were found in the supra-choroidea, near the large ciliary branches; but the greater portion were found in the neighbourhood of the blood-vessels and nerves in the stroma of the choroid, where they were in remarkable numbers scattered through the whole extent of the choroidea, forming a network of plaques, isolated cells, and groups of cells connected by bands of extremely varied size, and even by isolated fibres. The individual cells varied greatly in size and form. In tracing a single nerve-fibre from its point of exit from a cell, I observed, here and there in its course, a tolerably large nucleus, varying in form from a long oval to round. A part of these nuclei were not completely contained in the substance of the fibre. Sometimes the fibre presented a simple spindle-shaped swelling, without a discoverable nucleus at that point. At other times a nucleus was present, which was almost as large as the swelling itself, and evidently contained in it, and differing in no essential respect from the nuclei of the other ganglion cells. Again, it would loose itself in a cell or plaque, or join other fibres or small bands, which ultimately connected with or built the larger ones. One of the axis-cylinders generally formed a swelling or knob just at its termination in a nerve cell. Sometimes an axis-cylinder would terminate abruptly in a cell; but, as a rule, at least one of these passed gradually into the cell, so that it seemed as an enlarge-

ment of the axis-cylinder; the granular substance of the cell being often traceable for some distance into the former. Besides the large nuclei which certainly belonged to the cell, were others generally smaller, oval, or round at the one or other extremity of, or on one side of, the cell. These sometimes approached very nearly the appearance and size of the nuclei which certainly belonged to the cell proper. These nuclei belonged in many cases to the axis-cylinders at their termination in the cells, and as they passed around the cell; while at others it is possible that they belonged to the cell wall, though this was not often distinguishable as a separate membrane. These nuclei were, however, at times, in such numbers, and so much resembled the most perfect specimens of those of the ganglion cell proper, that it was impossible not to entertain the idea that a cell proliferation must have taken place, in consequence of the inflammatory process going on in the choroidea. This was especially applicable to the plaques, which generally contained from five to ten cells, each with a large nucleus not at all different from those of the isolated cells. As a rule, the cells in these plaques were easily distinguishable from one another; yet at times the plaques had the appearance of a single large cell, containing a large number of nuclei, often especially towards its circumference, closely ranged upon one another; the individual cells not being traceable, and the whole contents being composed of a highly granular mass. At the circumference of the plaques there were nuclei, similar to those already described in connection with the isolated cells, being here, however, in larger numbers, and presenting every grade of appearance between the ganglion cell and the nuclei evidently not contained in the substance of a nerve cell. A distinct wall for the plaques could not be seen, and it was impossible to determine whether or not each cell in a plaque was directly connected with an axis-cylinder. At times the isolated cells were closely arranged in a row, at others a group would be formed where the cells were arranged in pairs—each pair connected by the flattened extremity of the cells, as when in a state of proliferation. The cells and plaques in the stroma of the choroid were distinguished from those in the ciliary nerve stems by their irregularity of form, and, as a rule, their want of delicacy of contour. The former were also less transparent, and more coarsely granular than the latter. The cells in the large ciliary nerve-stems had besides no nuclei which did not belong to the cell proper, except in the case of cells which had a thick and distinct capsule. The great mass, if not all, of the cells and plaques being isolated in the choroid seemed to be connected with the nerve bands or stems composed exclusively of nerve-fibres with a single contour. As regards those in the large nerve stems, between the sclera and the choroid, there must be uncertainty; though a part of these, in all probability, were connected with those fibres with a double contour. I found no nerve-cells in

nerve bundles composed of fibres with a single contour (gray nerve-fibres), but observed that the nuclei found in these were large and extremely abundant, so much so that at times it seemed as though they were almost composed of these elongated nuclei. The nuclei themselves were often in a state of proliferation, in which case they were frequently less elongated, and at times almost round.

These cells are present in the normal choroid, yet there was so much in the appearances in this case which differed from what I was able to establish for normal cases, that it seemed almost impossible not to admit a pathological process affecting the nerves of the choroid, though a doubt might remain whether a proliferation of nerves and nerve cells had in this instance taken place. The principal difficulty lies in the uncertainty as to what is essentially nervous, and what is not nervous tissue.

The investigations of Heinrich Müller have made it highly probable that there are nonstriated muscular fibres in the outer coat of the large vessels of the choroid, and he has sought in his fact, at least, a partial explanation of the large number of nerves and nerve cells in this stroma of the coat of this eye. I was unable to trace a connection, other than that of proximity between this coat of the vessels and the nerves. In fact, I found no termination of the nerve fibres, except in the nerve cells or nerve plaques.

That a chronic inflammation of the choroid should have an effect upon the conditions of nutrition of the contained nerves, has nothing in itself of a nature to excite special surprise; and the fact that this should lead to a process analogous to what had already taken place in the development of the nervous system, and is continually taking place in the case of the other elements of the body, as a result of irritation or inflammation, can excite doubt only by the fact, that the question as regards the nervous system is new.

This question is of extreme importance as regards the pathology of the whole nervous system, and demands, for its perfect solution, a more thorough investigation; in order to determine what is essentially nervous tissue, especially as regards the nerves composed of fibres with a single contour.

It has been seen that in this case pain was a prominent symptom, and that this, together with the supposed influence upon the diseased process in the other eye, were the causes which led to its extirpation. It would seem that almost all the sources of pain were in this case present, except the exposure of the nerves themselves, to external mechanical or chemical influences. There were present infiltration and inflammation of tissues, at one time, at least, increased tension of the eye as a whole, stretching of membranes, and especially an inflammatory process in the tissue immediately around some of the nerve stems, particularly in the ciliary ligament and muscle; and,

lastly, there was a process going on in the nerves themselves, which, whatever its essential nature may have been, must have resulted in pain. Assuming that an inflammatory process in one eye may affect the other, this can only be explained by the indirect nervous connection existing between them. We could hardly imagine a process more favourable to bringing into play this sympathy, than one going on in the nerve trunks or cells themselves.

III.—A CASE OF RETINITIS PIGMENTOSA.*

THIS case was that of a child of 7 months old, which had lost its sight in consequence of an attack of ophthalmia neonatorum. It was affected with hereditary syphilis, and died of phthisis pulmonalis.

The globes were smaller than normal. The cornea small and opaque, and the lens and vitreous body were wanting, having been evacuated upon the perforation of the cornea. The retina was detached from the choroid; the choroid was itself closely attached to the sclerotica by an intermediate vascular membrane, separable from both, but most intimately connected with the former. The iris was situated as usual in such cases. The corneal cicatrix protruded backwards, and the iris which laid upon the cornea was only engaged in its border.

Microscopic examination of the choroid showed throughout its tissue, evidences of inflammation. The pigment of the cells of the stroma was imperfectly developed, and in many cells, were irregularly distributed masses of a reddish brown colour, not in granules as in the case of the normal pigment, but having a crystalline appearance. No exudations were observed on the internal surface of the choroid; and the pigment epithelium, as far as could be observed, was only changed as regards the amount and distribution of the pigment in the cells. I succeeded in obtaining good sections of the retina, both in a fresh and hardened state. The retina gave no evidence of atrophy; while here and there in its posterior half, it was almost double the normal thickness. In some of these thickened portions, there were masses of pigment. The pigment itself differed in no respect from that contained in the epithelial pigment cells; but the cells themselves had lost their characteristic appearance; probably from the action of the process hereafter to be described.

* This case has been already published, much less in detail, along with several others of a similar nature, together with the theory of the mechanism by means of which pigment finds its way into the retina. The accompanying cuts, which show with great clearness certain changes in the tissues of the retina, did not accompany that publication. See Würtzburger Med. Zeitschrift. III. Bd. 1862.

The thickening of the retina was the result of a proliferation of its proper elements, but, especially of those in the granular layers. It is certain that the radial fibres of Müller participated in the process, and were possibly principally affected; still, an examination of the section from which Figs. 5 and 6 were taken, rendered it almost certain that the cells composing the granular layers were also, at least partially, concerned; for in passing from the centre of the fibrous mass, where it breaks through the outer surface of the retina, towards the normal tissue of the granular layers, a gradual transition from the attenuated spindle-shaped forms to the normal forms of the granular layers was to be observed. The radial fibres of Müller were much thickened, especially in the inner layers of the retina; and in some vertical sections showed a beautiful series of strongly developed arches, with their convexities resting upon the separating line between the outer granular layer and the layer of rods and bulbs. The pigment itself was often entirely imbedded in the thickened retina, but without relation to the retinal vessels, as is the case in the typical form and, to a certain extent, in those cases more allied to these than the one now treated of. At other times the pigment mass was on the surface of the retina, but surrounded and embraced by the fibrous mass which here and there had broken through the outer surface of the retina, and grown together; thus forming a mass composed of fibres curving as they passed from the retina and then running parallel to its surface. In one instance, as is seen in Fig. 5, the layer of rods and bulbs was inclosed by the mass, and was quite well preserved in two or three small irregularities upon the surface of the retina, probably caused by the mass around the pigment. The process had evidently commenced before the retina was separated from the choroid, and when this took place masses of pigment remained attached to the retina at the diseased points.

Around one of the masses of pigment, completely imbedded in one of the thickened portions of the retina, which exhibited the development more of cells than of fibres, were a considerable number of vessels which seemed to be newly formed. Distributed throughout a large portion of the retina, but especially in the inner layers, were large numbers of transparent elongated cells, with and without nuclei, which, probably, must be brought into connection with the formation of new vessels. In the anterior portion of the retina, was a remarkably abundant development of easily isolable spindle-shaped cells, with very great prolongations. The Pars ciliaris retinae presented these also, together with abundance of cells with the appearance and arrangement of columnar epithelium. In the substance of the Pars ciliaris retinae itself, was an abundant development of large spherical masses of nuclei or cells (endogenous cells), at times inclosed in a thick, concentrically striated cap-

sule. In the whole thickness of some of the inflamed portions of the retina, were scattered disc-shaped brilliant cells, with proportionably large round nuclei, similar to those observed in the choroid, but not so large. In the layer of nerve fibres masses of cells were at times developed, so that, at some points, this layer had entirely lost its normal appearance. These cells were quite uniform in size, oval in form, and seemed inclined to be developed in layers, the long axis of the cell corresponding with the direction of the nerve fibres, showing that they were probably not connected with the system of radial fibres. These cells often encroached on the layer of nerve cells, but it was impossible to determine whether the latter had taken part in the process or not. The nerve fibres themselves were often in a varicose state, the varicosities being very various in size and round, slightly oval, or spindle-shaped, and having a delicate finely granular appearance. In these varicosities of the nerve fibres I observed nothing like a nucleus. This change in the nerve fibres of the retina was first observed by Heinrich Müller in a case of *Morbus Brightii*.

At the time that this case was investigated by me no similar case had been recorded in which pigment had found its way into the retina in this manner. Further investigation will, however, probably show that the changes in the retina here described are by no means rare. Heinrich Müller, in some critical remarks, in the same journal, upon the cases published by me, says of this case:—"But the observations in the case of the child, especially interesting on account of the freshness of the process, show that the same process takes place in other cases, and I have since seen it in cases not yet to be arranged in a distinct group."

Though this case is not a typical one of retinitis pigmentosa, and though the pigment finds its way into the retina in the latter class of cases in a way differing in many respects, yet it is of extreme importance, in studying all cases in which choroideal pigment is found in the retina, to remember that there were no essential changes here present in the tissue of the retina which I did not find present in all the cases examined by myself. The active participation of the retina in the process has been positively denied by one of the best authors upon this disease; still, I think that the fact that the cases usually come to be investigated after the retina has entered upon the stage of atrophy, will sufficiently explain why excellent observers should have overlooked the part played by the retina in all cases of this disease.

Here, as elsewhere, the present impossibility of always separating the changes in the essentially nervous elements from those in the connective tissue, is a great disadvantage in the study of the pathology of the retina.

It is evident that some of the changes of the retina above described would, were they observed in a case by means of the

ophthalmoscope, simulate the appearance of an exudation from the choroidea. This, together with changes in the layer of rods and bulbs described by me in the article above alluded to, and the remarkable development of glassy excrescences upon the inner surface of the choroid in one of my cases, render necessary a more careful study of the ophthalmoscopic, in connection with the microscopic appearances, in all these cases.

IV.—A CASE OF LAMINAR CATARACT.

(SCHICHT STAAR OF THE GERMAN PATHOLOGISTS.)

THE patient, from whose eye the lens examined was extracted by Dr. Linhardt, in June, 1861, was a young man about 20 years of age, who was diabetic. At an early period of his infancy it had been observed that his vision was imperfect, and the increase of the opacity of the lens rendered an operation necessary. The state of health of the patient was tolerably good; and, notwithstanding that this operation is generally not approved in cases where the cortical substance is mostly normal and the nucleus not hard, the lens was brought away with a great portion of the cortical substance, especially the posterior part, still adhering to the nucleus. A further objection to extraction by the flap operation consisted in the fact that the patients affected with diabetes are very liable to inflammation of the eye after this operation. But notwithstanding these objections the case did remarkably well; and when seen by me some weeks after the operation the result was entirely satisfactory.*

The lens was examined fresh and after being hardened. In the hardened condition the cohesion between the nucleus and cortical substance was so slight that it was impossible to obtain a section where they remained attached to one another.

It was evident, upon examination of the undivided lens, that the nucleus was more affected than is usual in this class of cataract. As is often observed, especially in cases where the disease progresses more rapidly, there were prolongations of the opacity from the equator of the opaque part of the lens into the surrounding normal cortical substance.

The surface of a section passing through the poles of the lens showed that the layers immediately around the nucleus were most changed, though the opacity extended throughout the whole substance of the nucleus. In thin sections this difference in the degree of opacity was most apparent. Such sections were examined under the microscope without the addition of any

* The facts in the history of the case here given were communicated to me by the assistant-surgeon.

fluid; and these showed that the layers around the nucleus were changed into a coarsely granular mass, portions of which simulated the appearance of masses of round granular nuclei. In the nucleus itself, which was more finely granular and less opaque, there were many elongated bodies which had the appearance of elongated cells or nuclei. These appeared at short intervals, and were evidently arranged with reference to the original course of the fibres or tubes of the lens, though other evidence of the original structure of the lens was wanting. This appearance did not cease immediately upon the application of glycerine; but, when examined, after having been preserved for some days in this fluid, all traces of these bodies were lost. These bodies and the surrounding substance were equally coloured when treated with carmine. Similar appearances have been observed in the normal lens of various animals under the influence of mechanical and chemical causes, by Dr. Kunde (*Graefe's Archiv. für Ophthalmologie*; Band 3) and by Heinrich Müller.

Fig. 1. A series of nerve cells found in the choroidea a short distance posterior to the equator of the eye in the layer containing the large vessels. As in most other cases the nerve fibres passing from these cells could be traced to cells, plaques, and larger or smaller nerve stems.

Figs. 2 and 3. Nerve plaques in the same layer of the choroid, not far from the macula lutea. Neither of these plaques show so well, as is frequently the case, the division into distinct cells. The term plaque seems to be best applicable to these; since their shape is quite irregular, and they seem to have the thickness of a single flattened cell. A nucleus or cell has become detached from Fig 2, as was frequently observed in other specimens in this case. Fig. 3 was one of the specimens which showed best the apparent proliferation of the cells in these plaques. The cell substance was very granular, the nuclei numerous, crowded together, and very coarsely granular. One or two more nerve fibres are seen passing through. Fig. 2, and at *a*, the nuclei in or upon an axis cylinder are to be well seen.

Fig. 4. Spindle-shaped swellings with and without nuclei, as seen in what seemed to be isolated fibres, though it is possible that they contained more than one. These were frequent, and often occurred several times in the course of what seemed a single axis cylinder as it passed from a nerve cell or plaque. Highly magnified.

Figs. 5 and 6 illustrate some of the changes in the retina observed in the case of retinitis pigmentosa treated of in Part III. In Fig. 6 the retina proper is indicated by the letters *a*, *a*, the

exudation by the letters *b*, *b*, and a pigment mass by *d*. The pigment protrudes partially into a cavity formed by a fold in the retina. In this cavity the layer of rods and bulbs was to be seen quite well preserved. In Fig. 6 *a*, *a*, indicate the retina, and *b*, the elements of the outer layers (granular layers) in a state of proliferation at the point marked by *c* in Fig. 7.

GROUP OF CASES OF CANCER OF THE EYEBALL.

(Continued from Vol. iii, p. 286.)

By J. W. HULKE.

As a further contribution I now record six more cases of intra-ocular cancer, with descriptions of the rough and minute appearances noticed in dissection, hoping at a future time, to add some remarks on the pathology and the influence of excision of the globe on the prolongation of life in this disease.

Case 6.—Melanotic Cancer of the Choroid.

A gentleman, about fifty years old, of remarkably strong, athletic build, and healthy appearance, was sent from the country for Mr. Bowman's advice, respecting his right eye.

April 16, 1857.—Between the cornea and the outer canthus there was a cluster of remarkably dilated episcleral veins. The pupil was dilated. There was only slight quantitative perception of light. The disease had been thought glaucoma. An ophthalmoscopic inspection revealed a vascular tumour in the lower and outer part of the fundus, and the eye was excised. In a few days the patient returned home convalescent, but died July, 1860. A few notes of the post-mortem inspection, kindly furnished by the family surgeon, contained no memorandum of the state of the orbit; but mention was made of certain tubers found in the liver which were believed to be cancerous.

On dissecting the eyeball, corresponding to the episcleral varix, the presence of a melanotic tumour was verified in the situation noticed with the ophthalmoscope. Its base reached from near the foramen opticum to the ciliary region, and its greatest prominence slightly overstepped the optic axis. Its free surface was overlaid with healthy looking transparent retina, not implicated in the tumour, but merely borne forwards by it. In the outer hemisphere the retina was separated from the choroid by a collection of dark chocolate-coloured serum. The tumour was strictly confined to the choroid. Its microscopic structures

were large circular cells, loaded with rich brown pigment; fusiform and attenuate-ovate fibre-cells, mostly pigmentless, enclosing one or more nuclei; free nuclei and granules.

Case 7.—Medullary Cancer of the Choroid.

A tall, well-made, woman, æt. 32, came from Scotland, March 3, 1857, to the Royal London Ophthalmic Hospital, for Mr. Bowman's advice. She had panophthalmia of the right eye of one month's duration, depending on the presence of a tumour within it. For several years this eye had been liable to neuralgic pain, accompanied by temporary obscuration; but the first intimation of the present disease was a permanent decrease of vision, which began twelve months before she came to London, and in ten months and a-half ended in complete blindness.

In addition to the inflammatory signs a deep-seated bright reflection was noticed, and, when the pupil had been well-dilated, this was found to proceed from a solid-looking, rounded tumour which projected from the fundus directly forward into the vitreous humour, and at the inner side nearly reached the back of the lens. Upon inspection under oblique illumination two sets of vessels were distinguished upon its surface—one set slender and arborescent, belonging to the retina, wound round the border of the more prominent nodulé, and were lost to view; the other consisting of larger vessels, emerging at several points of the surface of the tumour, behind the retinal vessels, without any regular plan of arrangement.

The presence of the tumour being evident, Mr. Bowman excised the globe, which he shortly after gave me for further examination.

On dividing it by a section running from before backwards near the optic nerve, the posterior hemisphere was found filled with a solid brain-like tumour, from the inner half of which a nodule projected forwards nearly to the lens. The retina covering the tumour was transparent and of healthy appearance, but that in the outer half, between the equator and ora serrata, was separated from the choroid by a collection of serum. The tumour was coated in front and externally by a layer of choroidal tissue, and was traversed axially by the posterior half of the retina, passing backwards to the foramen opticum, in the form of a solid cord within a sheath of choroid. The optic nerve outside the sclerotic was healthy. Those portions of choroid, not implicated in the tumour, as well as the ciliary muscle and iris, presented merely the ordinary appearances of inflammation.

The choroidal origin of the tumour in this case was indubitable. I regret that I did not preserve any record of its minute structures, but my firm impression at the time was that they were characteristic of medullary carcinoma. I saw the patient again in July, 1858; at which time the orbit was free

from disease, but her sallow complexion, lassitude, despondency, and the occurrence of vague pains in the right hypochondrium, made me suspicious of internal cancer.

Case 8.—Medullary Cancer of the Choroid.

An engineer, æt. 19, came under my care at the Royal London Ophthalmic Hospital, March 29, 1862, suffering from panophthalmia. The conjunctiva was red and oedematous; the episcleral veins were turgid; the eyeball was hard; the pupil was dilated, acting slightly with that of the other eye; the iris was injected, its texture confused, its colour slaty (that of the other being light blue), and its surface was convex, the depth of the anterior chamber being correspondingly diminished; the aqueous humour was cloudy, and through the dilated pupil a buff-coloured glimmer came from a deep-seated object behind the lens.

With the ophthalmoscope, a buff-coloured swelling, with sharp outlines, giving it a solid appearance, was recognised projecting from the outer hemisphere of the globe into the vitreous humour. The free surface of this swelling or tumour, was even and regular, it inclined backwards and inwards, a little to the inner side of the optic axis; and its most posterior visible limit lay nearly in the plane of the equator of the globe, where a waving, silvery fold of detached fatty retina came into view. The whole visible surface of the tumour was overlaid with apparently healthy, transparent retina, distinguishable by its proper vessels. Beneath the retina the pigment-epithelium of the choroid was discernible, not clothing the tumour as an unbroken sheet, but in patches. The other structures of the choroid were not recognisable with certainty. In the inner hemisphere of the globe, a thick, uniform diffused haze of the vitreous humour entirely hid the retina and choroid from view.

The patient had a fresh, healthy appearance, he came from the country, he presented no evidence of scrofulosis and no members of his family had had cancer or other tumours. The first symptom, noticed two years before, was contraction of the field of vision, beginning at its upper and outer part, and proceeding slowly and continuously, so that in twenty-one months the entire area was involved, and quantitative perception of light was gone. During this time no unhealthy appearance had been noticed by the patient or his friends, but two months after entire loss of sight, the eye became very red and painful. As yet no medical advice had been taken; but now the patient alarmed, ran from one ophthalmic surgeon to another, till he had consulted five. The two first whom he saw gave ambiguous and conflicting opinions, the third withheld an opinion, and the two last pronounced unfavourably.

avourably, and recommended the removal of the eye. Not a little bewildered, and very reluctant to undergo what he pictured as a very terrible operation, he came to the hospital for further advice.

At this stage, the diagnosis of an intraocular tumour presented no difficulty. The transparency of the retina, and the absence of any sub-retinal exudation, made a mistake impossible, though if the tumour itself had not been visible, the increased intraocular pressure would have been strong evidence against an uncomplicated sub-retinal dropsy. The insensibility of the retina in the inner hemisphere, considered in connection with the panophthalmia, rendered it very probable, that in this situation the retina was detached from the choroid; and the probability of this was heightened by the visible detachment of this tunic from the choroidal surface of the tumour near where the equator cut the axis of the globe, but its occurrence could not be similarly verified by inspection, owing to the cloudiness of the vitreous humour in this region.

The presence of a tumour beneath the retina and probably within the choroid being established, the next question respected its nature. The gradual progressive manner of the mutilation of the field of vision was inconsistent with a microscopic extravasation of blood in the outer layers of the choroid or between this tunic and the sclerotic, an occurrence which the patient's age and the absence of any previous disease in the eye, also rendered very improbable. The absence of any sign of a scrofulous dyscrasis, and the rarity of scrofulosis of the choroid, compared with the frequency of cancer in the coat, led me to express a confident opinion of the cancerous character of the tumour, and to urge the immediate excision of the eyeball whilst the growth was yet probably limited to its interior, as the best means of prolonging life.

The operation was performed on April 2nd. On the 5th an artificial eye was fitted; and on the 16th the patient returned home convalescent.*

Dissection of the Eyeball.—Its outer hemisphere was occupied by a tumour which projected from the walls of the globe, in a nodular boss-like figure, from near the ora serrata to the foramen opticum, reaching in front to within 2''' of the back of the lens, and at its greatest prominence, overstepping slightly the optic axis at the equator. In front of this line its free surface was overlaid with transparent retina, in which all the elements had a distinct and natural appearance, but behind it the retina ran backwards at a distance of about $\frac{2}{3}$ ''' from the surface of the tumour, as a nearly solid axial column to the foramen opticum. The retina was also separated from the choroid in the inner

* In July, this year, the patient wrote that he continued well, and that there were no signs of a return of the disease.

hemisphere by a collection of serum; but it had lost little of its transparence. In addition to the serum, there were some solid elements in this situation which I shall describe in connection with this portion of the choroid.

A fresh section of the tumour had a greyish brain-like aspect, and yielded a clear, viscid, yellowish, rather than creamy juice, by scraping. Its morphological elements were fusiform and oat-shaped cells, most of them prolonged at both ends, in delicate simple fibres. The body of these cells contained a nucleus of similar shape to the cell, which it nearly filled; and the nucleus in turn inclosed one, two, or three small, bright, round nucleoli. In some sections the cells were seen charged with deep orange brown pigment in mass, and not in the granulated form in which it occurs in the choroidal pigment-epithelium, was evidently of new formation. These sections in a few spots occurred in such considerable numbers that collectively they gave a tint visible to the naked eye, and they were present sparingly throughout the entire tumour. In many sections the cells were packed with their long axes more or less parallel, their fibres interweaving, but in several other sections, the cells seemed to radiate from a central space.*

Deep within the tumour, at a few points remote from the surface, were small rusty masses of closely crowded, circular, disc-shaped, non-nucleated cells, with clean hard outlines; they appeared to be red blood corpuscles, but I failed to discover any blood-vessels in connection with them, or to find vessels in any part of the tumour a little distance from the surface.

The relations of the choroid next occupied my attention. I found that it was traceable as a continuous membrane over the whole free surface of the tumour. Beneath the transparent retina, in front of the equator, the pigment-epithelium was little altered; but behind this line its beautiful regularity was much disturbed, the cells were swollen—rounded; they had lost much of the sharpness of their outlines, and in some spots were altogether absent. From the retinal surface outwards the pigment-epithelium, the elastic lamina, choriocapillaris, and larger choroidal vessels were successively recognised with varying degrees of distinctness in different places. The volume of the larger vessels was much increased, and the spaces between the vessels were enlarged—distended with the cells composing the tumour. Near the scleral surface of the tumour the multipolar pigment cells of the choroid occurred in some plenty: but near the retinal surface they were sparingly present. From these appearances it was evident that the tumour was confined to the choroid, in which it had originated, and that it originated in the stroma, particularly the looser tissue, which connects the

* An arrangement resembling that in a cut of a fibro-nucleated tumour, given by Paget. Lectures on Surgical Pathology, vol. ii, p. 169.

choroid and sclerotic. The number of multipolar pigment cells made it improbable that they were the parents of the tumour cells, and certain other cells, probably of the nature of connective tissue, alone remain as the probable source. In the inner hemisphere the choroid contained none of the tumour structures and presented simply the appearances produced by inflammation. The loose web of the lamina fusca was filled with serum, which, after immersion in alcohol, formed a horny, translucent, homogenous substance, increasing the thickness of the choroid in this situation to $\frac{2}{3}$ ". In addition to serum the space between the choroid and the coarcted retina contained a few small, dark-brown, structureless masses of horny consistence; the largest of which lay at the foramen opticum, and in the angle which the retina formed with the choroid at the ora serrata—these were probably metamorphosed fibrinous coagula.

Case 9.—Medullary Cancer of the Retina and Optic Nerve.

The patient was a little girl, æt. 7. The first sign noticed by her friends was an attack of inflammation. This was actively treated with calomel and opium, and belladonna; but not yielding to this treatment, which was persevered in during two months, she was brought to London for Mr. Bowman's advice. At this time the pupil was excluded, and the iris applied to the back of the cornea; there was an indistinct dull yellowish glimmer, deeply seated behind the lens; no perception of light; a large protrusion of the ciliary region in the neighbourhood of the insertion of the tendon of the musc. rect. ext.; the conjunctiva was injected and oedematous, and the episcleral veins were turgid. Mr. Bowman diagnosed an intraocular tumour as the cause of the panophthalmia, and removed the eyeball. To his courtesy I was indebted for an opportunity of dissecting it. The operation was done May 6, 1857, and the child was alive and well December, 1859.

The subfascial connective-tissue was hyperœmic. The spherical figure of the eyeball was interrupted by a considerable protrusion of its anterior and outer quarter. The vitreous humour was replaced by an adventitious tissue, which was so vascular that the freshly cut surfaces had a warm pink-grey colour, the uniformity of which was broken by a few scattered blotches of extravasated blood. Firm and tough centrally, the consistence of this tissue became softer near its external surface. The sclerotic and choroid presented merely the common appearances produced by inflammation, except in the situation of the protrusion where the tumour had perforated these coats and escaped from the interior of the eyeball, to spread upon the outer surface of the sclerotic, beneath the capsular fascia. Corresponding to the breach in the choroid and sclerotic the retina also was absent, but elsewhere this coat was distinctly traceable except,

behind, around the optic disc for a radius of 2'''. In this area it could not be distinguished from the tumour which seemed to spring from the optic disc.

Case 10.—Medullary Cancer of the Retina and Optic Nerve.

For this eyeball I was also indebted to the kindness of Mr. Bowman, who gave me it in a perfectly fresh state immediately after excising it, February 13, 1857. The patient, a little girl, was again seen by him, December, 1859, at which time the conjunctiva was healthy, and there was no appearance of any return of the disease.

The shape and measurements of the eyeball were natural. The pupil was widely dilated, and a yellow object was dimly visible through the hazy lens. The capsular fascia was matted to the sclerotic; the sub-fascial connective tissue, and the stumps of the muscles were hyperæmic. The iris, choroid and ciliary muscle presented in a high degree the common signs of inflammation. The vitreous humour was replaced by a pinkish-grey soft tumour of brain-like aspect, through which numerous small yellowish specks were scattered. The outer surface of the tumour was cleanly separable from the choroid, but none of the retinal tissues were recognised. The principal constituents were oval and roundly-oval cells, of from $\frac{1}{2000}$ " to $\frac{1}{2500}$ ", containing one or two nuclei. Amongst these a few larger cells were seen, brood cells enclosing a couple of the cells just described. The cells were embedded in a mixed granular and fibrillated matrix which occupied the meshes of a close vascular web that appeared to have grown into the vitreous humour from the optic disc. In the yellowish specks, the tissues were in process of atrophy.

Case 11.—Medullary Cancer of the Optic Nerve and Retina.

This eyeball was also given me by Mr. Bowman, who removed it from a child, April 21, 1856. It had been already opened and placed in glycerine, and had afterwards lain two days in diluted wood spirit. The interior was filled with a soft brain-like tumour, which occupied the position of the vitreous humour, and contained many small, yellowish friable masses. It was composed mainly of oval and roundly-oval cells, similar to those of the tumour in the preceding case, having an average diameter of $\frac{1}{2500}$ ", and containing one or two nuclei. Free nuclei were also present, but no blood cells were seen. The entire tumour was traversed by a close net of blood-vessels which were traceable to the optic nerve entrance. The retina was remarkably preserved, and was traceable most distinctly upon the exterior of the tumour, from the ora serrata to the distance of one line from the optic foramen. The iris, choroid, and ciliary muscle showed the common appearances of inflammation.

GROUP OF CASES OF ABSCESS AND TUMOURS OF THE ORBIT.

By J. W. HULKE.

1. *Acute abscess after a blow.*

———, æt. 27, was hit a severe blow on the right eye and temple; ecchymosis and swelling of the eyelids immediately followed. During the next three days he vomited several times. On the fourth day the eyelids became more swollen, and he had severe pain in the back of the eyeball, in the brow, and in the back of the head. On the fifth day, October 22, 1862, he was brought to the Royal London Ophthalmic Hospital. There was considerable ecchymosis and œdematous swelling of the eyelids, and on separating them the eyeball was seen to be advanced. The pupil acted, and the sight was not obviously injured. The conjunctiva was red and swollen. The pain was less intense than at first. He was dull and drowsy, in short, incompletely stupefied, but when sharply spoken to answered coherently. His pulse was only 56 in the minute. He had had rigors.

The symptoms pointed to an extravasation of blood in the back of the orbit (perhaps also to fracture) followed by abscess.

A caoutchouc bag of ice was laid on the swollen lids and temple, and a smart saline purge was given.

24th.—The pain and the swelling of the lids were less. Pulse still 56.

26th.—No pain in the orbit and forehead, and only slight pain in the occiput. Less drowsy. The redness and swelling of the conjunctiva gone. Pulse 60.

29th.—Pulse 80. The swelling of the lids nearly gone, and the protrusion of the eyeball notably less. A deep-seated hardness can be felt through the lower lid, at the inner side of the orbit.

30th.—Headache. Return of the redness and œdema of the lids. Fever.

Nov. 1.—A deep incision was made through the lower lid into the hard nodule, and some thick, curdy, shreddy pus was let out. No bare bone could be felt. A small piece of lint was laid in the cut.

4th.—Subsidence of the swelling and redness. A small drainage tube placed in the wound.

8th.—The eye is receding to its proper level, and slight swelling of the lower lid alone remains.

12th.—The incision has nearly cicatrized.

22nd.—The eyeball has resumed its normal position, its movements are free, and its sight unaffected. All swelling has disappeared. At night there is sometimes slight pain about the lower margin of the orbit, which is not tender on pressure.

As the patient did not return after this date, it may be presumed that his recovery was complete and permanent.

2. *Acute abscess in a boy, in whom pulmonary phthisis was developed after an attack of typhoid fever.*

A pale, weakly lad, æt. 17, who had never regained his strength since an attack of typhoid fever, eighteen months before, and had for several months been harassed with cough, and several times spat blood, was seized with violent pain at the back of the left eyeball. The pain was, at first, most severe in the morning; after two or three days it became less intense, and then was sometimes altogether absent for a few hours. At the end of a week the eyelids became greatly swollen. May 21, 1863, ten days after this, and on the seventeenth day from the first occurrence of pain, he was brought to the Royal London Ophthalmic Hospital. The upper lid and the brow were enormously swollen; the swelling had a dusky red colour, and fluctuated very distinctly. On raising the lid so as to uncover the eye, which was effected with some trouble, owing to the great swelling, the eyeball was found to be pushed forwards and downward. It was quite motionless, none of the muscles acting. The conjunctiva was red and œdematous, and furnished a thin, scanty, transparent yellowish discharge. The cornea was bright, the pupil acted, and sight was but little impaired.

There was manifestly an orbital abscess pointing through the upper lid.

An incision was made parallel to and just below the eyebrow, and several drachms of creamy pus escaped. Poultices were applied, and liquor cinchonæ with dilute nitric acid was prescribed.

Two days afterwards the swelling of the brow was gone, and that of the lid was less; the redness had also diminished. The chemosis and redness of the conjunctiva were less, but the cornea had become slightly dull. On the seventh day, it was necessary to re-open the incision, which had prematurely closed. By the tenth day, the eyeball had receded to its proper place; the dulness of the cornea had disappeared; there was scarcely any swelling of the eyelid, and the conjunctival redness and œdema were also nearly gone. The patient did not again return, so that the ultimate issue of the case is unknown.

3. *Chronic Abscess.—Extensive Caries of the Roof of the Orbit.*

A country lad, æt. 18, was admitted into the Middlesex Hospital, under my care, September 25, 1862. His left eyeball was displaced downward, outward, and to a slight extent also forward, by a swelling of bony firmness, involving the inner

border and inner half of the upper border of the orbit. The movements of the eyeball were but little restricted, its sight was unaffected. In the swelling, below the inner end of the eyebrow, there was a small sinus which admitted an Anel's probe to the depth of two lines only, and led into a small cavity of not more than three lines diameter. The daily discharge of pus (estimated at about two teaspoonfuls) was, however, too great to come from so small a surface.

He was a farm servant, had a bronzed complexion, and healthy appearance. He told me that two years previously, whilst in good health, he became aware of a painless swelling above the left eye and began to see double, the eye appearing to be out of its proper place. After eighteen months there was a sudden increase of the swelling, attended with much pain in the orbit, and redness of the lids. One week afterwards, an abscess burst through the upper lid near its outer end, close to the attached border, and discharged thick yellow matter. The swelling and pain then left him, but the wound never soundly healed, and occasionally gathered. After one of these returns of inflammation, an incision was made through the inner end of the lid, just below the margin of the orbit, where the sinus now is, after which the spontaneous opening permanently closed.

His description, coupled with the existing symptoms, left no doubt of its having been an abscess, but it continued uncertain whether this had originated in the orbit, or had advanced into it from the frontal sinus, abscesses of this cavity frequently pointing at the upper and nasal side of the orbit. Proptosis could not be relied on as a test, for I had twice known it occur in abscess of the frontal sinus. If an abscess of the orbit, its obstinate persistence furnished strong presumption of its being connected with diseased bone.

Having decided on laying open the sinus and exploring, September 25th, chloroform was given, and with some difficulty a fine probe was introduced, which, after passing an obstruction at two lines from the surface, slipped at once two inches deep into a cavity, in which it could be moved freely in a plane parallel to the roof of the orbit, and to a much less extent in an upward and downward direction. In trying to slit up the sinus with a probe-pointed bistoury, the firm swelling involving the margin of the orbit was found to be a mass of new bone, some of this having been cut away with forceps, the little finger could be passed into the cavity previously felt by the probe. About three-quarters of an ounce of thick glairy pus escaped from it. The cavity extended to the very apex of the orbit, and had a smooth continuous surface. The roof of the orbit terminated at about one-eighth of an inch from the anterior margin, and on passing the finger backwards was not met with again till near the apex of the cavity, so that there was an extensive gap in which the dura mater was felt bulging with a convex surface

into the orbit. The margins of this bony gap, which were rough and bare, were removed as far as was practicable. No sequestra were found. A drainage tube was placed in the cavity, and the wound left unclosed. On the following day there was a sharp local inflammation and fever. This was treated with cold and purging, and subsided on the fourth day, by which time there was free suppuration. He continued under observation in the Hospital till , the discharge of pus diminishing, but not entirely ceasing. Excepting during the inflammatory excitement following the operation, and on one occasion on which he, without my knowledge, got some beer, he never had headache, or any uneasiness in the head. In as the cavity contracted slowly, astringent injections were used apparently with some benefit, for afterwards it was found necessary from time to time to shorten the drainage tube.

4. *Hydatid tumour causing extreme proptosis.*

Being in the country in April, 1862, I was asked to see a boy who, for some months, had had an increasing protrusion of the left eyeball. I found the summit of the cornea of the left eye one inch in front of the same point in the right eye, the projection being so extreme that the eyeball seemed to lie altogether in front of the orbit. On attempting to return it to its place, a firm resistance was felt. The displacement was not only in a forward, but also in an upward direction, the upper eyelid being so distended by the eyeball, that the form of the cornea was very plainly visible through it. The lower lid was depressed, but without being everted, and separated from the globe by a firm, slightly elastic, obscurely fluctuating, rounded, smooth swelling, which protruded between the globe and lower border of the orbit, and also extended upwards along the outer border. The border of the orbit, although overlapped by the swelling, could be distinctly traced by making firm pressure. The skin had a natural colour, and could be slid upon the surface of the swelling; there was no œdema. The outward and downward movements of the globe were lost; in other directions there was slight mobility. Slight power of quantitative perception of light remained.

The boy, who before had been in good health, had become pale and weak. The protrusion of the eyeball began seven months before, and was attended with violent pain in the orbit and diplopia. After four months the pain ceased, but the protrusion increased.

The smooth, even, rounded outlines of the swelling, and its fluctuation, showed it to be a collection of fluid. What its nature—abscess, or hydatid cyst? The suddenness with which the symptoms set in, and the severity of the pain, spoke for an abscess; but had it been one, so many months would hardly

have passed without its pointing, and by the time I saw him, some cedema of the surrounding tissues, or gluing of the skin, might be expected. But the absence of inflammatory signs, which excluded abscess, rendered an hydatid cyst very probable, and I was disposed to consider it one, though unable positively to decide.

April 21.—On exploring the swelling with a grooved needle, a colourless limpid fluid spirted out, such as only comes from an hydatid. An incision was made through the lower lid, parallel with the attached border, into the swelling, on which several drachms of the same fluid escaped, and the finger could be slipped behind the eyeball into the back of the orbit, entering a large cavity with a smooth continuous surface. The optic nerve, surrounded by the muscles, was felt above, pressed against the orbital roof. No distinct and separate cyst was discovered. A strip of lint was placed in the cavity, and the incision was left open. The eyeball had slightly receded.

Next day the eyelids were puffed. The boy had headache and fever. The lint was withdrawn after a couple of days, and the wound suppurated very freely at the end of the week. About this time, on removing a poultice, an hydatid cyst was found in it, which, when I received it, after it had been some days in strong spirit, was about the size of a pullet's egg. After its escape the cavity quickly cicatrized.

In December, 1862, when I next saw the boy, the eye had receded to its proper place, and its movements were free. Only large objects, such as a finger, could be recognised, and that not with certainty. The incision having been made close to the attacked border of the lid, its scar had not dragged on the lid, and was scarcely noticeable.

5. *Fibroid Tumour.*

A charwoman, æt. 40, in August, 1861, began to be annoyed by the tears running over in the right eye. A month after this she became aware of a small painless swelling at the inner corner of the eye, and which grew so rapidly, that in December, when she came under my care at the Royal London Ophthalmic Hospital, it had become a prominent lobulated nodular tumour, which had displaced the eyeball outwards and upwards. It was solid and slightly elastic, and seemed to spring from the internal angular process of the frontal bone, and from the ascending process and the anterior margin of the orbital plate of the maxilla as far as the malar suture, beyond which a nodule could be felt projecting below and in front of the eyeball stretching towards the outer wall of the orbit. The tendo oculi deeply grooved the front of the tumour, the principal mass lying below it, and distending the lower eyelid. The movements of the eye were limited, but its sight was unaffected. The nostril was not obstructed.

A surgeon under whose care she had been shortly after its first appearance, treated the swelling, which occupied the situation of the lachrymal sac, as a mucocoele, by incision of the lower punctum lachrymale and dilatation of the nasal duct with probes. When I saw her, in December, the shape and solidity of the swelling precluded any further mistake; a certain degree of compressibility, coupled with the absence of any parchment-like bony plates or spicules, negatived the idea that the tumour had originated within the bone on which it was seated, as also the supposition that it had advanced into the orbit from the frontal or ethmoidal cells, so that a periosteal origin was most probable. The absence of pain and œdema, taken in conjunction with the non-existence of any signs of struma or syphilis, excluded the notion of its being a node. The absence of glandular enlargement and the freedom of the skin favoured its being fibrous, whilst the rapidity of its growth made one suspicious of cancer. As there were no signs of its having invaded the cranial cavity, its removal seemed neither impracticable nor attended with great risk. This was therefore decided on. As the eye was not at all protruded, it was inferred that the tumour had not crept behind it, its fixity being accounted for by the implication of the origin of the *Musc. Obliq. inf.* and the tendon of the *Musc. Obliq. sup.* at its trochlea in the tumour, so that its removal as a preliminary measure appeared to be unnecessary. The operation took place January 1, 1862. An incision following the contour of the orbit from the supraorbital notch to the superorbital foramen was found sufficient. The tumour was intimately blended with the periosteum of the ascending process of the maxilla of the outer and upper part of the right nasal bone, and of the internal angular process of the frontal bone. It had no other fixed connections, but it was found to have crept backwards, filling the apex, and depressing the floor of the orbit so much that at one time during the dissection it seemed as if it had entered the orbit from the maxillary sinus, which, however, was not the case. By dragging it forcibly with a toothed forceps, and carefully dissecting with a curved scissors, its removal was safely accomplished without injury to the eye. The surfaces of the bones from which the tumour had been detached were completely rasped with a raspatory and no trace seemed to be left. The bleeding was less than had been expected.

Fresh sections of the tumour had a slightly fibrous aspect, and furnished an abundantly creamy juice when scraped. The microscopic elements consisted of large blood cells, three or four times the size of a red blood disc, inclosing two or three nuclei; and oval and fusiform free nuclei in great numbers. These were entangled in a fibrous matrix.

The wound granulated and was cicatrized by the end of the month. The scar produced little disfigurement. The movements of

the eyeball by the *Musc. recti* were free, and its sight was good.

In March, three months after the operation, however, a small nodule could be felt in the scar, just above the *tendo oculi*. Its removal was urgently pressed, but the patient obstinately declined all further operative interference. In June, both the eyelids and the hollow between the root of the nose and the eye were distended by a knobby tumour which was larger and more elastic than that which had been removed. The skin was tight, red, and shiny, but not structurally implicated.

By September, a great increase had taken place; and the scar left by the operation had opened up, exposing a large deep cavity, the margins of which were soft, thin, semi-transparent, and its surface smooth and clear. Discharge was a thin colourless serum. On several occasions small hæmorrhages had occurred.

Feb. 18, 1863.—When she was next seen, the tumour had invaded the right upper maxilla; most of the teeth had fallen out, and several portions of the alveolar process had exfoliated. Slight hæmorrhages occur frequently.

May 1.—The nose and right half of the upper lip are greatly swollen; the swelling is firm but elastic. The skin is mobile, not very tense, of a bluish red colour. The upper part of the right cheek has disappeared; the orbit and the space occupied before by the body of the maxilla form a large open chasm which opens into the mouth, through its roof, into the posterior nares and into the left nasal cavities through the septum narium. This great cavity is lined with a smooth, glassy, pink, fleshy tissue, which is a growth rather than an ulcer, and discharges a colourless, inodorous serum. The surrounding skin is soft, supple; its edges are incurved and undermined. The opening in the roof of the mouth is surrounded by knobby masses of tumour. There is much difficulty of swallowing. No enlarged lymphatic glands are discoverable. The patient is extremely feeble; but content, and even cheerful.

July 15.—The nose and upper lip are gone. The tumour has invaded the left orbit and thrust out the eyeball. The neighbouring lymphatic glands continue free from disease, and there are no signs of secondary tumours in other parts.

6. *Fibroid Tumour.*

———, æt. 43, came to the Royal London Ophthalmic Hospital January 29, 1862. Her right eyeball protruded about ³/₈ths of an inch, and was also pushed downwards and outwards by a firm, solid, scarcely compressible, immoveable tumour which projected between it and the inner half of the upper margin of the orbit. The tumour seemed to have the same bony

attachments as in the case last described, viz.: the internal angular process of the frontal, the right nasal bone, and the ascending process of the maxilla. It also was deeply grooved by the tendo oculi, below which it could be felt passing backwards, along the angle formed by the inner side and floor of the orbit. She could move the eye to a limited extent outwards, inwards, and downwards, but not at all upwards. The veins of the upper eyelid were very swollen and tortuous. The sight was much impaired, smaller type than No. 16 (Jaeger) could not be read, and there was presbyopia of nearly $\frac{1}{2}$ ft. Fulness and tortuosity of the retinal veins were the only ophthalmoscopic signs.

She told me, that the first indication of mischief, nearly eighteen months before I saw her, was a troublesome confusion of small objects; she could not thread her needle, it seemed to her as if misshapen. Soon after this, she thought that her left had grown a little larger than her right eye. The confusion was probably a minor degree of diplopia, and the apparent enlargement was, no doubt, an undue prominence of the eyeball. A year after the appearance of these symptoms, she began to suffer from violent browaches lasting several hours; they still continued, but were now less intense than formerly. The surgeon under whose care she had first placed herself, had regarded the tumour as a syphilitic node, and treated her with mercurials and iodide of potassium, but without checking its growth. The absence of tenderness and œdema, when I saw her, were against the tumour being a node, and the patient's negation of ever having had syphilis was borne out by the failure of a careful inquiry for constitutional symptoms. She had miscarried three times, but this could hardly be attributed to syphilis, occurring on each occasion between the births of healthy children now living. Excluding an inflammatory origin, and the absence of glandular enlargement and cachexia being unfavourable to the supposition of cancer, it was thought to be probably a fibroid tumour springing from the periosteum and bones. Its wide attachments to the orbital walls, and extension into the back of the orbit, inferible from the limited mobility and protusion of the eyeball, made it more uncertain than in the preceding cases, whether the tumour could be completely extirpated.

February 12.—Chloroform having been given, an incision was carried along the margin of the orbit, which allowed the eyelids to be reflected, and brought the surface of the tumour thoroughly into view. The deep attachments were even more extensive than had been surmised; the floor, inner wall, and roof of the orbit, were all implicated. The tumour had no distinct limits, and was continuous at its circumference with the periosteum. The roof of the orbit, more than the floor and inner side, was rough and spiny, and on detaching some shreds of the tumour from it with a raspatory, a portion of it was torn away, leaving a hole through which the

outer surface of the dura mater could be felt. During the operation, the patient had become very faint. The bleeding was very free, and as it continued, the wound was filled with strips of lint. By taking great care, the eyeball had not been injured. Two hours afterwards, the strips of lint were drawn out, and the incision was closed with wire stitches.

Its rough minute characters showed the tumour to belong to the recurrent fibroid class.

Sharp local inflammation took place, attended with great swelling of the eyelids and much aggravation of the headache and fever; but these symptoms subsided on the establishment of free suppuration. A fortnight from the day of operation the patient went home, and the wound by that time had nearly scarred; cicatrization was almost complete. The sight was improved, and the eyeball more mobile.

The respite did not last long. On April 2nd (within one month of the time of the operation), I could feel a small nodule at the root of the nose, and a second beneath the upper edge of the orbit. The cornea was drawn towards the inner canthus by the contraction of the cicatrix, and the eye was quite fixed. The left eye became congested and irritable.

June, 1862.—When I next saw her, the brow and forehead corresponding to the right half of the frontal bone were swollen, and there was another nodule as large as a marble, at the root of the nose. The cornea had sloughed away, and the iris, coated with a film of lymph, was exposed. The night before, nearly a wine-glass full of blood had flowed from a small opening in the scar of the operation. About this time the nose bled frequently. The left nostril was almost completely obstructed. She suffered much from constant severe pain in the forehead, and often retched. She had become very feeble, and was very low-spirited.

I did not see the patient again till January 25, 1863, by which time the tumour had grown very large, it distended both the eyelids and eyebrow, and reached upwards for two inches on the forehead; it was immoveable on the bone, but the skin was free. There was again a deep groove in the situation of the *tendo oculi*, separating two nodules of the size of marbles, which were ulcerated at their summit. The ulcers had soft edges, and the skin was not infiltrated nor adherent to the exposed growth; the raw surfaces were clean and smooth, they exuded a nearly colourless serum. I was told that on several occasions they had bled, but the quantity had never exceeded half an ounce.

From these ulcerated nodules, the tumour now reached across the root of the nose. There was still no enlargement of the lymphatic glands; the pain in the brow and occiput had become more intense, and epistaxis occurred more frequently and was more copious.

In February, I found the tubers at the root of the nose had grown considerably since the last date. The skin overlying

them was tight from distension, and red, but not structurally involved. The tumour had crept outwards, into the right temporal fossa, and across into the left orbit, protruding the eyeball, the sight of which was failing. The left eye protruded slightly, and the eyelid, forehead and temple were overrun with dilated veins. The retching occurred more frequently.

March 1.—The pain in the head had assumed a more violent shooting, plunging character lately. The retching continued.

On the 6th and 7th, a jet of blood spirted from the tumour for several minutes. The loss on each occasion was estimated at about half a pint.

On the 9th, a third but less copious hæmorrhage occurred.

12th.—A small tender knot, evidently a lymphatic gland, was felt in front of the ear. The right side of the face felt tight, and mastication was painful. The retching still continued.

April 13.—The left eye protruded strongly; she could only see just sufficiently to find her way about in her own home. The whole forehead and right temple were much enlarged. The ulcer had become large and deep; its surface continued to be clean and glassy, and the edges were thin and soft, not sinuous and tuberculous, as the edges of a cancerous ulcer. The surrounding skin was not implicated. The lymphatic gland which had been enlarged, could no longer be felt. Deglutition had become difficult. The retching persisted. The pain in the head was distracting. The poor woman was well nigh worn out.

7. *Fibroid Tumour.*

A robust, healthy-looking servant girl, æt. 18, came to the Royal London Ophthalmic Hospital, May 7, 1862, with a swelling at the inner corner of the right eye. It was a prominent oblong knob between the root of the nose and the eyeball, deeply channelled by the tendo oculo, and firmly attached to the internal angular process of the frontal, the right nasal bone, and the ascending process of the maxilla. It had thrust the eyeball outwards, and nearly half an inch forwards. Its limits were not distinct, its circumference merged insensibly into the surfaces of the bones on which it was seated. Its firmness was considerable, but not that of bone. The skin was healthy and free. The right nostril was nearly obstructed. No enlargement of the lymphatic glands was discoverable.

She said that, four years before she had worn a style for an obstruction of the nasal duct. After two-and-a-half years it was laid aside for occasional dilatation with a probe through the lower lachrymal punctum. This treatment was continued for several months, when the epiphora and the muco-purulent discharge from the lachrymal sac ceasing, she thought herself cured, though a slight thickening remained in the situation of the sac. This, however, gave her no anxiety till six months

before I saw her, when its increase attracted her notice, and since that time its growth had steadily progressed. She declined an operation, and never returned.

8. *Sarcomatous tumour, at first apparently of an innocent nature, but afterwards putting on a cancerous character and invading the orbit from the left nostril.*

A feeble, very emaciated old man, æt. 70, came to my outpatient room at the Middlesex Hospital, early in April, 1862. The inner half of the lower, and inner third of the upper lid of the left eye were distended with a solid tumour. The skin was glued to it, dull-red, tense, and shining, which also interrupted the inner commissure. The eyeball was about $\frac{1}{4}$ " in advance of the other, and its movements were very restricted. He had just enough sight to find his way about, but old nebulæ and senile cataract prevented any estimation of the degree in which the impairment was due to the pressure which had thrust the eyeball from its position. His other eye had been blind many years. A slightly tender lymphatic gland about the size of a horse bean was felt at the angle of the lower jaw, on the left side. There was frequent epistaxis from the left nostril which was nearly blocked.

He told me that the year before, in May, my predecessor, Mr. Flower, had extracted a polypus from the nostril, and that this was attended with such profuse bleeding that he fainted, and could not leave the Hospital for several days. In the following August he returned, with swelling (protrusion?) and redness of the eye. On this occasion no operation was done, and he left after a few days to be re-admitted on the 20th October under the care of Mr. Moore, who slit up the nostril (dividing at the same time the inner commissure of the eyelids), and removed a very considerable fleshy mass. This was also attended with very free hæmorrhage.

The characters of the tumour, Mr. Moore informs me, were those of simple sarcoma, and its minute structure led to no suspicion of cancer.

By the end of April a very appreciable increase of the tumour was noted. The distension of the eyelids, particularly the lower lid, was much greater. A prominent knobby mass filled the space between the lower eyelid, the root of the nose, and the eyeball. The surface of this mass was ulcerated, and exuded a thin, almost colourless foetid ichor. The palpebral conjunctiva was swollen and red. The obstruction of the nostril had become complete. May 1st.—Having become very reduced by frequent bleeding from the left nostril, he was again taken into the Hospital. The ulcer was spreading along the edges of the eyelids, and it bled more readily when touched than before. 6th.—The increased distension of the lower eyelid had

now pushed it away from the eyeball, and slightly everted it. The exposed conjunctiva formed a thick fleshy-red roll, which nearly reached the lower border of the cornea. The proptosis was greater, and, partly from the upper displacement of the eyeball, partly also from the distension of the upper lid, the cornea was almost entirely buried by the lid. The inner end of the lower lid having lost its fixed attachment, the lid was widely separated from the globe by the growing tumour. The fleshy roll of exposed conjunctiva was coarsely granular and coated with a muco-purulent exudation. The ulcer continued to extend; its edges were raised, sinuous, somewhat rounded, but not hard; in its neighbourhood the tumour felt soft and elastic, but at some distance from it, harder. The gland at the angle of the jaw had become larger and softer. At the attached border of the lower lid the tumour merged without distinct limits into the cheek which was cedematous and brawny beyond the hardness of the tumour, as far as the lower border of the malar bone. Acute pain was felt in the left temple and cheek, which were hyperæsthetic.

28th.—A steady increase of the tumour was again noted. The inner half of the lower and inner third of the upper lid were destroyed by ulceration. The cheek was more swollen. The gland in the neck still larger and softer.

In June, Mr. Moore attempted the destruction of the tumour with chloride of zinc (having been encouraged to this by the success which had shortly before obtained by this mode of treatment in a case of epithelioma of the lids invading the orbit), but its growth outran its death, and the caustic was laid aside. By the middle of September the orbit was a large ragged hole lined with fleshy fungoid masses, and discharging a horribly foetid ichor. The soft parts for some distance around the orbital margin and much of the left cheek were involved in the tumour.

The infiltration continued to extend, always keeping in front of the ulceration. From time to time slight hæmorrhage took place. The gland in the neck became very soft, the skin broke, and a characteristic cancerous ulcer formed here. The patient lingered till January, 1863, when death ended his sufferings. For several weeks he had taken no notice of those around him, unless spoken to.

On examining the body, the tumour was found to have broken into the cranium through the roof of the orbit and cribriform plate of the ethmoid bone, and to have invaded the anterior lobes of both cerebral hemispheres for some depth. The left optic nerve in the orbit was lost in the cancer, whilst its intracranial portion had a natural appearance. The right optic nerve, that of the eye which had been many years blind, was soft, reddish grey, and shrunken. The liver contained a single cancerous tuber; no secondary cancerous depôts were formed in any other organs.

TWO OR THREE NOTES ON PRACTICAL POINTS.

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FORCEPS TO FIX THE GLOBE IN ANY OPERATION ON THE EYE.

THE suggestion I am about to make under this head is due to a difficulty often to be met with in our operations.

If the eye is held by a single point of conjunctiva, the eyeball may have two different kinds of motion, in consequence of the laxity of the tissues held. In the first place, wherever the eye may be held, it has a considerable degree of motion from side to side of that point. In the second place, it may rotate round the point of conjunctiva as a centre. The first objection is that which I had found in practice; the second occurs to my mind only in theory. Both of these objections are remedied by holding the conjunctiva at *two points, one on either side of the globe.*

Some months ago I had the misfortune to make a cataract in a case of posterior synechiæ and recurrent iritis, for which I did corelysis in both eyes. Chloroform was not given. I had detached the pupillary adhesion in one eye, as usual, without any danger or accident*. Then, in the other eye I proceeded in the same manner; having introduced the spring speculum to keep open the lids, and seized the conjunctiva and sub-mucous tissue below and close to the margin of the cornea, to depress and steady the globe, I made the preliminary puncture of the corneal margin with a broad needle, on the inner side, that most convenient for reaching the adhesions, when suddenly, the eye was turned to the same side so as to meet the instrument, causing the point of it not only to pass further into the anterior chamber, but, of course, also further *backwards* into the pupil. I could not sufficiently quickly withdraw the broad needle, and, of course, the lens was extensively wounded, and a cataract the inevitable result. Contrary to the foregone conclusions of those who have not tried corelysis, or the results of those who have done it carelessly, cataract need not be made in this operation, as I have always said of it, and I do not think I have had any case of this accident, except that I have mentioned and accounted for in my paper on Corelysis (Vol. 2, p. 316); for the case of cataract from operation, which I have now just related, can hardly be said to be a result of corelysis, as I had not really begun to detach the

* And with a good result—vision being much improved, and the iritis, I suppose, obviated for the future.

pupil adhesions, and the accident might have just as well occurred in operating for an artificial pupil.

This ill result, however, made me endeavour to find a remedy for a casualty which is so often probable. The eye was, in the above case, held at the lower margin of the cornea, and so, as I have said, *depressed*, it was therefore not moved up or downwards by the patient but laterally and perhaps, to some extent, by rotation.

The forceps is commonly used at Moorfields to steady the eye. I had found before this time the danger threatened by the partial and, in some directions, extensive movements allowed in its use, two opposite recti, at least, being more or less free to act. In devising the instrument, I wish to bring into notice, as a means of *completely* fixing the globe, I kept to the idea of forceps which practically seems to be best, and sought to acquire *two opposite fixed points*.



In short, I have had forceps made with double ends, to each blade two points five-eighths of an inch apart. (The woodcut represents the forceps one-third less than its real size.) Each end or point of one blade has a little tooth which fits between two others on one of the two ends of the opposite blade. These teeth not only project towards each other, but a little downwards, so that, in use, the toothed projections come first into contact with the conjunctiva. The upper end of the instrument is like the common forceps. The middle of each blade is made rough externally, as usual, that the instrument may be held firmly. Mr. Weiss, the maker, has introduced a *stop guide*, that is to say, a guide with a shoulder, so that by one contrivance the two purposes are gained. The guide projecting at right angles from the inside of one blade enters the hole into which it fits in the other blade, when the two are approximated, and the blades cannot be brought together more than they should be, because of the stop made by the shoulder of the lower, thicker part of the guide itself. The total length of the forceps is four inches and five-eighths. The blades are much widened below

their middle, and each blade has a U shaped extremity, an inch and two-eighths in depth, the space between the two branches of the blade being of the breadth of the distance apart ($\frac{5}{8}$ in.) of the points, even to the bottom of the U shaped interval, the place of divergence of the double end of each blade. I think it important that this interval should be so deep and wide, if it were V shaped the instrument would be

more elegant but less practical, for without a wide space between the points of the forceps light is not so well admitted, and any instrument that may be wanted is used less conveniently.

The distance between the ends of each blade of the forceps I made somewhat greater than the breadth of an average cornea, so much so that my forceps may seize the conjunctiva and, which is important, the sub-conjunctival tissue, at that distance from the margin of the cornea on two opposite sides, which seems to afford the best hold and command of the eye, according to experience of ordinary forceps. Sometimes in using the new forceps I have rested the hand in which it is held on the forehead of the patient, and, as I stand behind the head of the patient, who is supposed to be lying down, I have then operated *below* the forceps. At other times I have rested my hand, holding the forceps, on the patient's cheek, and done the operation *above* the instrument. The points at which the conjunctiva, etc., is seized, of course, need not always be in the line of the palpebral aperture, they may be above and below or at any other two opposite points around the cornea. I have found the instrument answer its purpose well; with it I have *complete* command of the globe, and I know of no real inconvenience or difficulty in its use or after ill result. If it is more difficult to seize a little fold of conjunctiva, etc., at two points at once, than at one only, it is soon done easily, and it is worth trying. At first an unnecessarily large fold is taken up by one or both ends of the closed blades.

I need not stay to examine the general principles on which *common* forceps has been preferred to other means of fixing the eye. It exerts no compression of the globe. It does not only prevent the movements of the eye in one direction, but in two, and partly in more than two, directions. Still, it does not prevent all the movements of the globe. The most recent English writer on this subject (Mr. France, "Guy's Hospital Reports," 1858, pp. 81—102) says he finds artery forceps hold "the eye perfectly still and motionless, or as nearly so as possible." With double-ended forceps it will be found possible to fix the eye as completely as can be desired, and that without any reservation. Indeed, the command which Mr. France acquired over the patient's eye was not only, at any rate in extraction, gained by the forceps he used, but by supplementing its firm hold with *two other points* at which the globe was steadied. He says (p. 93), "I place my fore and middle fingers on the globe in the usual way, and thus perfect the command of the organ." Whilst operating he gave up the forceps to an assistant, but even if this could always be done, two fingers of the operator's hand could not, in all operations, be used to steady the globe, nor does he say that the two fingers are always thus to be used.

Mr. France, of course, does not believe that any important injury can be done to the conjunctiva by the forceps. To this I

would add that, if the conjunctiva becomes torn, or is necessarily compressed very much, in using ordinary forceps, it is not so likely to tear, nor need the conjunctiva be so firmly compressed when a double forceps is used, because the strain of the attempted movements of the eye is halved and equalized. Forceps with teeth certainly give a good hold of the conjunctiva, and I do not know that it does more injury than is done by the firmer compression required when the broad ends of forceps without teeth are used. It is not absolutely necessary that the line between the two points at which the eye is steadied by my forceps should be through the centre of the cornea, so that it can be used in extraction, when a large section of the cornea is required, or in any operation. Mr. France has a paper "On the use of Forceps in Extraction of Cataract" in this Journal (Vol. 2, pp. 20—25), in which its advantages are shown; and he is followed in this by Mr. Poland (Vol. 3, pp. 268—270).

ELASTIC BANDS AND EYE BANDAGES.

The bandages applied to the eyes have been hitherto of the kind used, exclusively until lately, for them and other parts of the body—long rollers of linen or calico. Elastic bandages, elastic stockings, etc., are comparatively modern inventions of general surgery, and their advantages may well be made use of for some cases of eye disease. The various elastic belts, now so much used, are, I believe, either of an elastic cotton material so woven as to have the greatest amount of elasticity to be obtained in this way, or of some material in which are introduced threads of india-rubber for greater elasticity and strength. For bandages applied to the eyes, in some cases, I would suggest the addition to these of the narrow elastic bands sold at the stationers' shops. These little bands are of india-rubber only. They are of two kinds, either circles of different diameters cut out of sheets of india-rubber, or cross sections of india-rubber tubes of variable diameter. (Both may also equally, of course, vary in width and in thickness of the elastic material.) The latter, for general purposes, are the most recent invention, and are generally best and most lasting—for the strain upon them and the amount of tension they exert when stretched are, *ceteris paribus*, equal. But when the first-mentioned bands are stretched in use, one of their edges, the inner circumference of the discoid ring, exerts most compression on the part over which it is stretched, inasmuch as it is smaller in size. This property I have usefully adopted in some cases, I shall refer to hereafter, of ectropion, in which, as of course the margin of the lid would first become everted, I have applied one of these bands round the head of the patient with the edge of smallest circumference next to the lid's margin.

For many eye complaints we apply a bandage over the eye or eyes—especially after accidental or surgical injuries—for

arrest of bleeding, to prevent an escape of some of the contents of the eye, or simply for rest to the eye. A light bandage to the eyes, especially when without it they cannot be kept at rest, should be more frequently applied than is now usual. The cotton or linen bandages in use are not always satisfactory, because however well and carefully they may be applied at first, they soon become ill-fitting, crumpled, or folded together and pressing irregularly on the parts; or, if the parts become swollen, being inelastic, they become unbearable and are removed by the patient altogether, or they slip down over the back of the head, and are useless for the purpose required. I wish, therefore, to suggest a trial of cylindrical circles, of various widths and thickness of material, of webbing with or without india-rubber threads. The circular band or bandage is easily slipped over the patient's head, or buckled, and made to cover one or both eyes as may be required. It will, at any rate, afford that which is much to be desired, a certain amount of steady, constant, equal support or pressure. It should be generally but little smaller than the circumference of the patient's head. Of course, *ceteris paribus*, the smaller is the elastic circle the greater is the pressure of the bandage. These general suggestions occurred to me first in the treatment of two cases of ectropion of peculiar difficulty, which I have had lately at Moorfields, and I have not only found them good in theory. The cases were of that kind which Mr. Critchett, in a recent lecture, has likened to paraphimosis. The two children to whose cases I refer, were very ill-attended to by their parents, and my way of explaining such cases as these is as follows: a child has some form of ophthalmia for which a lotion or drops are to be applied to the eyes—this is not easily done, and whilst the child is exerting its orbicularis to shut the eyes—the mother, not knowing how to open them, drags upon the skin only of the lids, the upper lid becomes everted, and then she does not know how to replace it; it then soon becomes swollen and fixed in the abnormal position. In illustration of the difficulty of curing this kind of ectropion, I may allude to the case Mr. Critchett mentions, in which he passed one or more sutures between the edges of the opposite lids so as to keep the upper lid in its right position. My treatment in each case was as follows: I chose an ordinary narrow india-rubber band (such as is used to keep papers together) of a size somewhat less than the circumference of the child's head. The lids were washed; they could be, of course, placed in right position, but would only remain so whilst held down by the finger. The band was put behind the back of the patient's head, and in front over the upper lids, the edge of the band reaching just to the lower edge of the lids. This has answered perfectly in these two cases. If the child rolled about, the band was not easily displaced. If it became displaced,—if, for instance, it slipped lower down the back of the head,—still, being elastic, it was of use to secure the eyelids. The child's

nose, protected with a little pad, afforded a central fixed position for the band. In a day or two the tendency to eversion was overcome and the swelling of the lids diminished, partly, no doubt, by the steady, constant, equal pressure of the elastic band. Why should not a circle of broad elastic webbing be slipped over the head, to cover one or both of the eyes, whenever we wish either to keep the lids closed for a while, or to stop bleeding, etc., by a certain amount of pressure? The material is either fine and light or stout and strong. Cinctures such as these can be quickly put on, are adjusted at once, and give a uniform support. The size of the belt of elastic material before it is put on, the thickness of the material, the presence or absence of india-rubber threads, etc., will give the greater or less amount of pressure required, and an intelligent patient can himself adjust the elastic bandage, which he could not do so well if a length of common roller-bandage had been tied round his head and got displaced by any chance.

LASHES ACCIDENTALLY INVERTED AND NOT FROM ENTROPION OR TRICHIASIS.

I have a few remarks on the subject of the case given in this Journal (vol. iii, pp. 8-12) to add to those appended to it. Since it was published, I have taken notes of ten somewhat similar cases, and I will now give the heads of them, and any interesting facts concerning them, omitting those general features in which they agree with the case first mentioned, viz., that the inverted lashes were close to the external canthus, strong and natural in their character, of the upper lid, tucked under the lower lid and directed outwards, were easily replaced with a probe and showed no tendency in themselves to re-inversion. My treatment of these ten cases has been simply to replace the misdirected lashes with a small probe.

In the first of the ten cases (May 27th, 1861), one lash only was tucked in.

2. (August 12th, 1861.) One lash only tucked in. It grew about a sixth of an inch from the outer commissure (left). This patient was a man who had iritis, and said he had been rubbing the eye.

3. (September 16th, 1861.) Again one lash only (left) was tucked in. This man also had iritis. [A pupil (Royal London Ophthalmic Hospital) standing by, to whom I pointed out this case, told me that he often, whilst rubbing his eyes, got some of these outer lashes inverted and that he then replaced them with his finger.]

4. Elizabeth Mears, aged 11, came to me, at Moorfields, with catarrhal conjunctivitis of both eyes. She came twice, and each time was better for the ordinary treatment of simple ophthalmia.

The third time she came her father said she was "worse," so I examined the eyes again particularly; I found some lashes—two of the right and six of the left—tucked in. They were near but not those next the outer canthus. The lashes were replaced, and the ophthalmia soon afterwards got well.

5. (April 16th, 1862.) The edges of both upper lids were thickened by old disease, and all the lashes were *inclined* inwards, that is to say, both rows of lashes were directed evenly more down and less outwards than is natural. She had recent ophthalmia of the right eye. In it one lash only, the outermost, was tucked in.

6. (April 28th, 1862.) A boy, 9 years old, with phlyctenular ophthalmia, of long standing, of both eyes. One lash only, the most external of the left eye, was tucked in. Could the foreign body in this case have been the cause of this form of ophthalmia?

7. (July, 1862.) This patient had the results of old iritis—posterior synechiæ. According to her account, she had had the ophthalmia of both eyes for about a week. Three or four outermost lashes of the left eye were tucked in. The left eye was most inflamed.

8. (July 28th, 1862.) Joseph Nichols, aged 13, granular conjunctiva of both eyes. The upper two-thirds of both corneæ were opaque (old nebulæ). This patient had numerous lashes tucked in—five of the left eye and six of the right; four of the latter were as usual of the upper, *the two others were the outermost of the lower lid, crossing the other inverted lashes, tucked in under the upper lid, and there retained*. The lashes were, as usual, easily replaced, and I ordered drops of sulphate of copper for the granular lids. On August 1st he came again to the hospital and said he was much better. I found a single lash of the left upper lid tucked in. It was easily replaced. He was cautioned against carelessly rubbing his eyes, and, though he continued to attend for the old disease, he had no more trouble with accidentally inverted lashes.

9. (November 27th, 1862.)—Alfred W. Anderson, aged 8, was brought to me, at Moorfields, by his father. Both were very intelligent. The boy told me that a week previously he had been rubbing his eye because it itched, and then it "came bad." The four outermost lashes (right) were tucked in. The left eye was quite well. The father rightly remarked that his son's lashes were very long. The boy looked strumous, and his right eye was inflamed with a phlyctenular form of ophthalmia. There was only one of the phlyctenulæ, and this was *at the outer side* of the margin of the cornea. The lashes being replaced, the boy said his eye felt more comfortable. In order to see if this alone would cure the case, I did or ordered nothing else. I saw him only once more. The eye was much better; but two, not the outermost, of the same lashes were again tucked in. They

were replaced very easily by simply straining the lids open. The father of the boy said he had no lashes turned in when he left home with him that morning, and that he must have rubbed them in whilst waiting at the hospital.

10. (February 9th, 1863).—George Brown, aged 26, came to me among the out-patients at Moorfields. He had been a soldier in India, and there had had ophthalmia. His conjunctivæ were slightly granular. He had eight lashes (left) tucked in—not the outermost by about as many more. His lashes were very long, some I found to measure more than two-thirds of an inch.

The only features that are new in these cases, or different to those of my former observations are, that in one case, a lash of the lower lid was found to be tucked in; in two of them, the ophthalmia, co-existent, whether cause or effect, was phlyctenular; in several, one lash only was tucked in, or some of them were found, a second time, to have been thus displaced. Was the itching, complained of by some of the patients, produced by the irritation of the foreign body already in the eye, or was it the beginning of ophthalmia for which the patients rubbed their eyes and displaced the lashes? Altogether I am inclined to believe that generally the slight ophthalmia found to exist with this inversion of certain eyelashes is caused by the accident of rubbing the eye first causing the lashes to be tucked in. I am much indebted to Mr. Workman, our house surgeon, at Moorfields, for the following remarks sent to me, in a letter, some few months ago, confirmatory of this view of cause and effect, and containing other interesting particulars, the result of his experience and careful observation on a recent occasion when ophthalmia was prevalent in a large public establishment. He says,—

“When assistant-surgeon to the Central London District School, Hanwell, it was one of my duties to inspect every day the eyes of the children in the girls’ and infants’ school, between four and five hundred in number, and remove into a ward any who had contracted ophthalmia. I found that this disease was frequently excited by foreign bodies lying in contact with the conjunctiva, and amongst other things I often noticed that a few of the lashes of the upper lid, at the outer part, were tucked in, and would produce, in a few hours, a slight purulent discharge, which would cease immediately on the replacement of the lashes, no other treatment being usually required. This was due, probably, to the fact that as the eyes were examined daily no foreign body could remain long in the eye without being observed and removed.

“Loose eyelashes and dust produced exactly the same result; there was seldom any inflammation of the ocular conjunctiva.

“I may mention that nearly all the children had suffered more or less from ophthalmia, and were liable to fresh attacks, the effect of which seemed to lessen the sensibility of the conjunctiva and render it remarkably callous to the presence of

foreign bodies ; the children frequently telling me that they did not know anything was in their eye till I discovered it.

"On account of this tolerance they did not seek to have the lash or dust removed, and it would be allowed to remain often long enough to set up a passive form of ophthalmia.

"Children in whom the conjunctiva was healthy were more troubled by the presence of a foreign body irritating the eye so as to lead one to suspect its presence.

"I always considered that lashes were tucked in from the child's rubbing its eye, and it seemed to occur generally in those children who had long eyelashes. I have kept no record of these cases and so am unable to state how many I have seen, but they were sufficiently numerous to make my fellow assistant-surgeon and myself notice that the tucking in of the outer eyelashes of the upper lid was an exciting cause of ophthalmia."

ON THE USE OF ATROPINE PAPER.

In the last number of this journal I alluded to other advantages of the use of the new vehicle than that of convenience to the surgeon. More personal experience, and the evidence of many friends in favour of the paper, enable me to speak of some of the cases in which, from one cause or another, it seems to have been especially advantageous. In the first place I must mention those posterior synechiæ, for which we employ strong solutions of sulphate of atropine, to obtain their detachment in this way, if possible. In certain cases of this kind, great pain is experienced by the patient, and in some of them, at any rate, it is obviated by the use of the paper medium for its application. It was so in the most marked instance of this kind of pain I had ever seen—a strong man, of good courage, a hospital patient of mine—he had had syphilitic iritis, and there remained synechiæ, which being recent, and not very extensive, were at last detached by continually using atropine. The man attended very regularly to my instructions ; but the drops used to give him great pain for some time after each application. I told him to warm the solution before he used the drops, as this makes their use very much less disagreeable to the feelings of some patients. I had a new solution prepared in the hospital, but still he could hardly persevere in the treatment, the importance of which I had explained to him. Still he himself regularly applied the drops. When I applied them he used to lie on the sofa, with his hands over his eyes, and groan with pain, which, after a while, became more endurable. Of course, in hospital practice I generally use the drops, which are always at hand, but in this case I tried the paper. He had, from this time, little or no pain, comparatively none ; and, as I have said, the adhesions were finally all detached.

I may now quote another class of cases, for which I am in-

debted to my colleague, Mr. Dixon. I cannot do better than give his own words concerning the paper altogether, as in them he has given an account of these observations. He says, "I have made great use of your atropine paper, which I find *most useful* with children and timid patients of all kinds. The sight of a bottle suggests to them the application of painful drops, whereas, with a little tact, one can put a square of your paper in contact with the globe, without their having any suspicion of its having been done. Within the last few months I have met with three patients, in whom, through some strange susceptibility, the use of a solution of atropine, two grains to the ounce of water, induced not only considerable irritation and redness of the eyeball, but an erysipelatous condition of the lids; one of the patients was a woman under my care at Moorfields, where the drops were applied by the nurse, so that one knew exactly what had been used. The lids of both eyes became extremely swollen, red, and cedematous; quite as much so as one sees in a case of gonorrhœal ophthalmia. There was, however, no discharge from the eyes, except of tears, nor anything like the characteristic network of catarrhal ophthalmia on the ocular conjunctiva. I had operated on each eye by keratonyxis, for cataract, and, of course, I wished to keep the pupils dilated during the process of solution; but I was unable to continue the atropine drops, for the reason I have stated. I then used your atropine paper, putting a square of it between the lower lid and the globe, every morning, and removing the paper at the end of half an hour. This sufficed to dilate the pupil, without causing any irritation either of the eye or lids.

"I have now another case of the same kind, where extreme redness and swelling of the lids, resulted from the use of atropine drops to one eye. The daily application of the paper obviates all inconvenience."

In the same form as the atropine paper, Mr. Squire has prepared some, of a different colour, soaked in a solution of the Calabar bean. It acts quickly as a myotic, and in this way, and as an antidydratic, the Calabar bean is likely to be so very useful in ophthalmology, that I suppose the paper prepared with it will be in as great demand as the atropine paper.

For my own part I have further only to observe, that the French "*Bulletin Général de Thérapeutique*," of March, 1863, mentions, that a chemist of Paris has *invented and patented* a paper for "collyres secs gradués." The editor of that journal has since kindly written an article, containing some notes I sent him on the subject, and extracts from my article of January, 1862. It is inserted under the head of "Correspondence," at page 361, of a number of the same journal for April, 1863.

NOTES OF A CASE OF XEROMA, PRODUCED BY A STRONG SOLUTION OF NITRATE OF SILVER, DROPPED ON THE CONJUNCTIVA, FOR THE CURE OF PURULENT OPHTHALMIA.

By J. C. WORDSWORTH.

E. McA., æt. 6 weeks, was brought to the Royal London Ophthalmic Hospital, June 21, 1862. The mother of the child stated, that on the third day after its birth, she noticed that the lids were red, and that there was a yellow discharge from the eyes. She applied to a medical gentleman in her neighbourhood, who gave her a lotion to be applied to the eyes three times a-day. She continued to drop in the conjunctiva this lotion, to the time of her visit to the Hospital, though she had noticed that "there were films on the transparent part of the eye," and that the lotion produced deep black stains on the linen, &c.

The corneæ were both covered by superficial sloughs; a thin muco-purulent discharge bathed the conjunctiva.

A lotion of a weak solution of alum was ordered to be applied several times a-day, and a little spermaceti ointment to be smeared on the edge of the lower lid.

June 30.—The discharge had quite ceased, and the whole conjunctiva had become opaque and dry. The lotion was discontinued, and glycerine was directed to be dropped into the eye every hour.

From time to time, as the child was brought to the Hospital, it was observed that the conjunctiva gradually became more opaque and dry, closely resembling cuticle. No mucus or tears ever appeared on the conjunctiva.

April 1st, 1863.—The eyes appeared much as before described. The child has suffered considerably in health, and it now looks hydrocephalic.

A CASE IN WHICH A FRAGMENT OF IRON PASSED THROUGH THE CORNEA, LENS, &c., AND BECAME IMPACTED IN THE SCLEROTICA NEAR THE ENTRANCE OF THE OPTIC NERVE.

By J. C. WORDSWORTH.

R. D., æt. 37, a boiler-maker, while engaged at his work, was struck in the eye by a piece of steel from the head of the hammer, November, 28, 1862.

On the following day he applied at the Hospital, when it was observed that the lens was partially opaque; the pupil being dilated with atropine. A dark line was noticed traversing the lens, and was supposed to be the track of the foreign body. The lens was too opaque to enable the fundus to be carefully explored.

December 6.—Considerable pain in the eye had occurred since last visit. The lens was turgid, and projecting into the pupil. It was then extracted by Schufler's method; being quite soft, it was easily removed, leaving a clear pupil. Some vision was recovered, and the pain, and vascularity of the globe generally, subsided. After being in a quiescent condition for some time, considerable pain returned; the eye was suffering from general ophthalmia, which resisted all treatment, and as there was still a foreign body in the globe, it was determined that extirpation of the eyeball was the only means calculated to afford him relief; especially as the other eye began to suffer much.

March 4.—Excision of the globe was effected under chloroform.

An examination of the eyeball shewed that the lens had been entirely removed. Some exudation into the pupil had partially closed its area. The vitreous was perfectly diffuent, but clear. The retina and choroid appeared normal. Close to the entrance of the optic nerve, was a boss of soft white structure, as large as half a pea, rising from the retina. On removing this, it was firmly adherent to the retina and choroid, and inclosed a fragment of iron of about $1\frac{1}{2}$ line in length that was embedded in the sclerotica.

NOTES OF A CASE IN WHICH PULSATION WAS OBSERVED IN
THE CENTRAL RETINAL ARTERY OF A HEALTHY EYE,
DURING A TEMPORARY FAINTNESS.

By J. C. WORDSWORTH.

While lately examining, with the ophthalmoscope, the eyes of a young gentleman who was suffering from the effects of a blow with a cricket-ball on the left globe, that had been followed by extravasation of blood into the vitreous humour, I was surprised to see very evident pulsation suddenly occur in the retinal artery of the right eye. My patient was a healthy, but rather nervous young man of about 18 years of age. He was standing during the examination, and gradually became sick and faint. My first intimation of some change in his circulation was the sudden appearance of a pulse in the artery, evidently synchronous with the heart's action. I then observed that his face was very pale, and dewed with perspiration. On his recovering, after taking some restorative, I again examined the right eye; the pulsation had ceased to be visible, but in a few minutes reappeared as before, and he again complained of feeling faint. In a short time he was again quite well, and the pulsation had ceased.

In the intervals between the pulses the artery became very

empty, its outlines well marked, while the centre of the vessel was pale. With each cardiac systole, it appeared partially filled with a momentary tide that seemed too feeble to raise the walls of the vessel to its usual contour.

CASES OF PARALYSIS OF THE APPARATUS OF ACCOMMODATION, SHOWING THE ACTION OF THE CALABAR BEAN.

REPORTED BY C. J. WORKMAN, *House Surgeon.*

The following cases of paralysis of the Accommodatory Apparatus, under the care of the Surgeons at the Royal London Ophthalmic Hospital, well exhibit the action of the Calabar Bean. The Extracts used were kindly supplied by Messrs. Allen and Hanbury, of Plough-court, Lombard-street; each grain being equal to 40 grains of the bean. That called No. 1 was prepared from the powdered bean by cold alcohol, while No. 2 was obtained from the residue by boiling alcohol. Their properties seem to be the same.

They were applied in the following manner:—The point of a camel's hair-brush was moistened in water and rubbed on the extract so as to take up a very minute quantity. The brush was then drawn two or three times along the conjunctiva of the lower lid. The application caused only a very slight degree of smarting, and did not produce any peculiar sensation in the eye during its action.

The pupil of a healthy iris seems to retain for some time the power of dilating on the exclusion of light. This, however, gradually gets weaker, till at last, when it is fully contracted, it remains fixed. Where the iris is paralysed, the pupil remains fixed throughout the whole action of the extract.

1. *Syphilitic Periostitis.*—*Paralysis of the 3rd Nerve.*

The master of a coasting vessel, æt. 43, a wiry, weather-beaten sailor, apparently in robust health, came to the Royal London Ophthalmic Hospital, Dec. 3rd, 1862, with paralysis of the third cranial nerve of the left side, of two months' duration. There was incomplete ptosis. The cornea was everted, he could not bring it into the middle of the lid, nor turn it upwards or downwards. On closing the right eye he could not walk quickly and steadily, but staggered and was dizzy, not being able to judge of the distance and inclination of the ground. When both eyes were open there was diplopia. The left eye read No. 16 Test Type. Its optic nerve was reddish, and the retinal veins were over full.

Iodide of potassium produced a slight improvement in a fort-

night. He now was obliged to go to sea, and did not return till February 11, 1863, when the ptosis was complete, and the other paralyzes as at first. Corrosive sublimate was substituted for the iodide of potassium, which he had continued to take, with benefit, for several weeks after leaving the hospital. In a month, the Levator Palpebræ had slightly regained its lost contractility, but not so the ocular muscles.

In June he again presented himself. There was now ptosis, and complete paralysis of the muscles of the left eye supplied by the third nerve; a motionless pupil, 3''' in diameter, and paralysed accommodation. Twenty inches was the nearest point at which No. 14 type could be read. The outer and inner Recti muscles of the right eye were also paralysed, and the upper Rectus partially so. The pupil had a diameter of $2\frac{1}{2}$ ''', and was nearly motionless. Twenty-six inches was the nearest point at which No. 10 type could be read.

Right Eye. No. 1 Extract.				Left Eye. No. 2 Extract.		
Hour.	Number of Type.	Proximate Point.	Diameter of Pupil.	Number of Type.	Proximate Point.	Diameter of Pupil.
*10. 30	10.	26''	$2\frac{1}{2}$ '''	14.	20''	3'''
10. 40	8.	23''	2'''	8.	21''	$1\frac{3}{4}$ '''
10. 45	6.	$18\frac{1}{2}$ ''		6.	$17\frac{1}{2}$ ''	
10. 55	4.	18''	$1\frac{3}{4}$ '''	4.	15''	$1\frac{1}{4}$ '''
11. 5	2.	$17\frac{1}{2}$ ''	1'''	2.	$14\frac{1}{2}$ ''	1'''
11. 40	1.	$17\frac{1}{2}$ ''	1'''	2.	$12\frac{1}{2}$ ''	1'''
12. 30	1.	$16\frac{1}{2}$ ''	1''' f.†	2.	$12\frac{1}{2}$ ''	1''' f.

(The observations were now discontinued).

On the following day—

10. 40	8.	$17\frac{1}{2}$ ''	2'' f.	10.	$17\frac{1}{2}$ ''	$2\frac{1}{4}$ ''' f.
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2. Paralysis of the Third Nerve from injury, of three years' duration.

March, 1862.—Bridget H., a short, bronzed, hale-looking Irishwoman, æt. 40, has incomplete ptosis of the left upper eyelid. The cornea is everted, and cannot be turned upwards, downwards, or inwards. The pupil is widely dilated, and inactive.

She says that three years ago the branch of a gooseberry-bush struck this eye, one of the thorns piercing the lower eyelid. Great pain and swelling followed, requiring several incisions.

* The first line in each table exhibits the condition of the accommodation previous to the application of the extract.

† f. Fixed.

'' Inch.

''' Line.

When the swelling subsided and the cornea could be seen the paralysis was discovered.

Galvanism and iodide of potassium were used for several months without benefit in this case.

Right Eye. No. 1 Extract.				Left Eye. No. 2 Extract.		
Hour.	Number of Type.	Proximate Point.	Diameter of Pupil.	Number of Type.	Proximate Point.	Diameter of Pupil.
11. 30	1.	8½"	1½" m.*	16.	8½"	3" f.
11. 45	1.	8½"	1¼" m.	12.	7½"	2½" f.
11. 55	1.	5"	1"	6.	6"	2"
12. 10	1.	5"	1"	4.	7"	1"
12. 34	1.	4"	¾" f.	1.	6"	¾" f.

(She sees distant objects clearer).

On the following day—

10. 45	1.	4½"	1"	4.	10½"	2"
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3. *Periostitis producing paralysis of the 3rd, 4th, 6th, and transorbital branches of the 5th cranial nerve; with proptosis, probably from hæmorrhage.*

A seamstress, æt. 27, came to the Royal London Ophthalmic Hospital, May 9, 1862, complaining of double vision. The upper and lower Recti muscles of the left eye scarcely acted, and the outer and inner Recti, with the Obliqui muscles, were quite paralysed. The eye maintained a nearly central position. It was also pushed forward nearly ⅓rd of an inch, and though it receded slightly under pressure, it could not be made to resume its proper situation in the orbit. The pupil was dilated and motionless. There was presbyopia, and smaller than No. 10 Test Type could not be read. The conjunctiva of the globe and lids, and those parts of the face and scalp supplied by the trans-orbital branches of the fifth cranial nerve, were nearly insensible. The Levator Palpebræ was incompletely paralysed. The only ophthalmoscopic sign was an over-fulness of the retinal veins.

The patient, a short, stout woman, said she had always enjoyed good health till her present illness, which began about three months before with pains about the left brow and temple, and slight puffing of the eyelids at night. After two months, retching set in, and still continues. Fourteen days before she came to the hospital, her sight became confused, and then

* m. Mobile.

double. A week after this she had a fit, in which she was insensible, struggled violently, and foamed. Her left eye seemed to those who held her as if it would start from its socket, and it has since continued to protrude.

The paralyses were attributed to pressure from periostitis, and the sudden protrusion of the eyeball during the fit to extravasation of blood from the congested vessels of the inflamed periosteum. The implication of so many nerves—the third, fourth, sixth, and transorbital branches of the fifth cranial nerve—fixed the apex of the orbit, where the nerves lie closer together, as the focus of the inflammation. The troublesome vomiting pointed to cerebral irritation.

The cause of the periostitis was not apparent. No blow had been received, and the patient had not been exposed to cold draughts. She presented no scars of scrofulous abscesses or other signs of strumæ. She had been married nine years, and at no time had had any symptoms of constitutional syphilis, neither was she rheumatic.

She was directed to take grs. iv of iodide of potassium four times a day, and this was followed by rapid improvement. In a fortnight, the vomiting had ceased, the ptosis was gone, the paralyses of the other muscles had also nearly disappeared, and sensibility was returning. The eye was much less prominent. Ten days from this the movements of the eye were almost perfect, and a further diminution of the proptosis was noted. In another three weeks the muscles acted perfectly, and sensibility was restored. The protrusion of the eyeball was scarcely appreciable, there was no double vision, and she could read No. 2 Test Type.

In January of the present year she returned to the hospital with a second attack of periostitis. This time the upper and outer part of the margin of the orbit was swollen and tender. The symptoms again soon yielded to iodide of potassium.

In May she had a third attack, for which she is yet under treatment.

Right Eye. No. 2 Extract.				Left Eye. No. 1 Extract.		
Hour.	Number of Type.	Proximate Point.	Diameter of Pupil.	Number of Type.	Proximate Point.	Diameter of Pupil.
11. 25	1.	9 $\frac{1}{2}$ "	1 $\frac{3}{4}$ " m.	16.	10"	3" f.
11. 35	1.	6"	1 $\frac{1}{4}$ "	2.	11 $\frac{1}{2}$ "	2" f.
11. 50	1.	5 $\frac{1}{2}$ "	1"	1.	6"	1" f.
12. 22	1.	5 $\frac{1}{2}$ "	$\frac{3}{4}$ "	1.	5"	$\frac{3}{4}$ " f.
12. 35	1.	5"	$\frac{3}{4}$ " f.	1.	5"	$\frac{3}{4}$ " f.

June 20th, at 10.35, one square of Christison's bean-paper was put into the left eye.

Left Eye.						Right Eye.				
Hour.	Number of Type.	p'.*	p.*	r.*	Pupil.	Number of Type.	p'.	p.	r.	Pupil.
10.35	14	5½"	3½"	30"	3" f.	1	5½"	3½"	∞	1½" m.
11.	1	5½"	3"	∞	2"					
11.30	1	4½"	2½"	∞	1"					

The paper used in the following experiments was prepared by Mr. Hanbury, of Plough-court, Lombard-street. It was dipped three times in a saturated alcoholic solution of the extract. A water-mark divided the paper into squares of a line and a-half.

4. *Paralysis of the 3rd Cranial Nerve from Syphilitic Inflammation.*

S. K., æt. 32, was admitted, June 17, 1863, as an out-patient, under the care of Mr. Hulke, with complete ptosis of the upper eyelid of the right eye, and paralysis of the internal, superior, and inferior Recti, as also of its accommodation.

He had had a chancre, and has now a syphilitic eruption.

At ten o'clock, his vision being as shown in the first horizontal line, one square of the bean-paper was put into the right eye.

Right Eye.						Left Eye.					
Hour.	Number of Type.	p'.	p.	r.	Diameter of Pupil.	Number of Type.	p'.	p.	r.	Diameter of Pupil.	
10.	16	3"	2½"	∞	2½"	1	6"	2"	∞	1½"	H = $\frac{1}{18}$
10.20	10		1½"	∞	2"						
10.45	8		½"	∞	1½"						
11.10	6		½"	∞	1¼"						

In order to test the influence of atropine in neutralizing the

* p'. The proximate point at which the type can be read.

p. The proximate point of distinct vision taken with Donder's Optometer.

r. The most remote point of distinct vision.

effects of the Calabar bean, half a square of Mr. Streatfield's atropine paper was put into the right eye at 11.45. One hour afterwards No. 18 was the smallest type which could be read, and this not closer to the eye than 9"; p. and r., taken with the optometer, were $\frac{3}{4}$ " and ∞ . The diameter of the pupil was 4'''.

On the 20th of June, H. $\frac{1}{24}$ having been verified in the right eye, two squares of Calabar bean-paper were put into this eye at 10 o'clock.

Right Eye.							Left Eye.				
Hour.	Number of Type.	p'.	p.	r.	Pupil.		Number of Type.	p'.	p.	r.	Pupil.
10.	16	11"	8 $\frac{3}{4}$ "	57"	3'''						
10. 45	12				3'''	Twomore squares were now put in.	1	5	1	∞	1 $\frac{1}{2}$ '''
11. 5	12	6	9 $\frac{1}{2}$ "	∞	2 $\frac{3}{4}$ '''						
11. 25	10	6 $\frac{1}{8}$	9 $\frac{1}{2}$ "	∞	2 $\frac{1}{4}$ '''						

5. Mydriasis (dependent on general debility?).

Maria —, æt. 16, a girl in weak health, was admitted with mydriasis, under the care of Mr. Streatfield, a few weeks since. Her mother stated that her daughter's sight had always been weak. Tonics improved her health, but had no effect on the mydriasis. June 18th the Calabar bean was used to each eye, two squares of the paper being put into the right, and No. 1 Extract applied to the left eye at 10.45. The state of the vision at this time is shown in the first horizontal column.

Right Eye.						Left Eye.				
Hour.	Number of Type.	p'.	p.	r.	Pupil.	Number of Type.	p'.	p.	r.	Pupil.
10. 45	2	7"	4"	16"	3'''	1	7"	4"	45"	3'''
11. 15	2	6"	1 $\frac{1}{2}$ "	13"	2'''	1	4"	1 $\frac{1}{2}$ "	32"	1 $\frac{1}{2}$ '''
12. 30	2	5"	2"	19"	2'''	1	3"	2"	33"	1 $\frac{1}{2}$ '''

On June 22nd, at 10.35, No. 1 Extract was put into the right, and No. 2 Extract into the left eye.

Right Eye.						Left Eye.				
Hour.	Number of Type.	p'.	p.	r.	Pupil.	Number of Type.	p'.	p.	r.	Pupil.
10.35	4	6"	9"	36"	3'''	1	7"	7"	53"	3'''
11.20	1	5½"	6½"	39"	2'''	1	5½"	5"	42"	1½'''
12.20	1	5"	5"	42"	1¾'''	1	3½"	3½"	62"	1¼'''

On the 29th, No. 2 Extract was put into the right, and No. 1 into the left eye, at 10.50 o'clock.

Right Eye.						Left Eye.				
Hour.	Number of Type.	p'.	p.	r.	Pupil.	Number of Type.	p'.	p.	r.	Pupil.
10.50	1	5½"	3"	63"	2½''' f.	1	5½"	3"	65	2½''' f.
12.5	1	4½"	2¼"	∞	1½ and irregular.	1	2½"	1½"	∞	1'''

July 1st.—No. 2 Extract was again applied to the right, and No. 1 Extract to the left eye, at 11 o'clock.

Right Eye.						Left Eye.				
Hour.	Number of Type.	p'.	p.	r.	Pupil.	Number of Type.	p'.	p.	r.	Pupil.
11.	2	4½"	3"	59"	2½'''	1	4½"	3"	∞	2½'''
11.30	1	2½"	2"	∞	1¼'''	1	2"	½"	∞	¾'''

Right Eye.							Left Eye.				
Date.	Hour.	Number of Type.	p'.	p.	r.	Pupil.	Number of Type.	p'.	p.	r.	Pupil.
July 9.	10.30	No. 1	4"	2½"	∞	2½'''	No. 1	4"	2½"	∞	2½'''
July 16.	10.40	No. 1	3½	1½"	∞	2½'''	No. 1	3½"	½"	∞	2½'''

6. *Mydriasis and Ptosis.*

Rebecca —, æt. 26, under the care of Mr. Critchett, has slight ptosis of the left upper eyelid, which began three months ago, and mydriasis.

May 29th.—No. 2 Extract was put into the left eye.

Left Eye.						Right Eye.				
Hour.	Number of Type.	p'.*	p.	r.	Pupil.	Number of Type.	p'.	p.	r.	Pupil.
10. 15	10	10½"			2½''' f.	1	7½"			1'''
10. 35	8	8½"			2''' f.					
11. 10	2	8"								
12. 50	6	9"			¾''' f.					

June 23rd.—No. 1 Extract was applied to the left eye at 10.10 o'clock.

Left Eye.						Right Eye.				
Hour.	Number of Type.	p'.	p.	r.	Pupil.	Number of Type.	p'.	p.	r.	Pupil.
10. 10	12	9"	14"	42"	2½'''	1	7"	3½"	∞	1'''
10. 20	6	9"	5"	43"	2'''					
10. 45	1	8"	3½"	∞	1½'''					
1. 10	6	11"	5"	51"	1'''					

The results of these cases confirm the opinion of other observers, that the ordeal bean acts powerfully on the accommodation of the eye, as well as having the power of contracting the pupil, and thus is antagonistic to atropine.

In its action the accommodation seems to be affected before the iris. The case of Stephen K. is a good example of this, as on the 20th of June his right eye was under the influence of atropine, put in three days previously; the ordeal bean-paper acted very slowly, and it showed its first effects on the accommodation some time previous to any visible change in the size of the pupil.

The effect of the ordeal bean seems to last longer on the iris than on the ciliary muscle.

On referring to the case of Rebecca A. it will be noticed that the last notes, taken on May 29th and June 23rd, show that the pupil had been gradually contracting, while the range of accommodation had become more limited.

The case of Maria B. appears to show that some permanent good may be expected, in some cases, from the use of the bean. This patient sought advice from Mr. Streatfield for very imperfect vision, accompanied by dilated and fixed pupils. Eleven years before this she had been under the care of Mr. Critchett for corneo-iritis. Mr. Streatfield treated her for some time with tonics without benefit to her sight. The ordeal bean was then tried, and after the first application her range of accommodation increased. A reference to the notes of her case will show the great improvement in her vision due solely to the use of this remedy after a few applications.

This patient was a particularly good one for taking accurate notes, as she was very intelligent, and her range of accommodation seemed so well marked that she was always able to tell exactly the point where the wires of the Optometer became at all confused.

AFFECTIONS OF THE EYE FOLLOWING ATTACKS OF NEURALGIA, OR INJURIES TO BRANCHES OF THE FIFTH NERVE.

BY J. HUTCHINSON.

A certain number of cases have during the last few years come under my observation, illustrating more or less directly the influence of the sensitive nerves of the face upon the functions or nutrition of the eyeball. Some of the more valuable of these I now purpose to record. The whole subject of reflex paralysis and reflex disturbance of nutrition is at once so obscure, so important, and so difficult of satisfactory proof, that I shall need no excuse for citing the cases in considerable detail. It is especially desirable in reference to such facts, that every opportunity should be afforded to the reader of estimating the character of the evidence for himself, and of correcting what may appear to him erroneous inferences. In not a few, perhaps in almost all, of my cases, there is ample room for difference of opinion as to diagnosis. In some it is not by any means certain that central disease did not exist, to which both the lesion of sensation and the lesion of nutrition were alike due. In others the existence of a blood poison (*e.g.*, syphilis), was quite possible by which the results might have been modified.

Before proceeding to cite my cases, I will venture to introduce the subject by a few preliminary memoranda.

1. By reflex paralysis or reflex disturbance of nutrition are meant, changes in the functional activity or structural soundness of any organ or part consequent upon injury or irritation inflicted upon another part and transmitted by means of nerves.*

* The opinions of observers are at present very much divided on some of these questions. The eye has for long been considered to supply these

2. Reflex paralysis, as contradistinguished from reflex disturbance of nutrition, is said to exist whenever the loss of functional power is unattended by structural changes; or only by such slight changes as are wholly inadequate to produce the results manifested.

3. In many cases the changes are probably due to influences exerted through the vaso-motor nerves only, by which are induced alterations of blood-supply to the affected part.

4. It is probable, however, that nutritive alterations may be induced through the nervous system independently of any primary change in the calibre of the blood vessels.

CASE I.—*Injury to the left frontal region—Permanent mydriasis and paralysis of the ciliary muscle of the left eye.*

An intelligent Irishman, aged 70, came to me on September 10, 1862, for advice in consequence of stiffness in his back, &c., which he referred to an injury received three years ago. I found his left pupil dilated to three times the size of the other, and quite fixed. He could see fairly with both eyes, but not so well with the left, *i.e.*, he could read No. 1 with the right, but only No. 8 with left (using glasses). With the ophthalmoscope I found the media clear in both. The arteries of the left retina and the veins also were perhaps rather smaller than in the right. He complained that objects looked much smaller to the left eye than to the right. With a stronger glass he can see as well with the left as right. Over his temple, extending from the middle line across to the left, was a large deep scar. This scar extends to, but not across, the course of the frontal nerve. He has perfect sensation on both sides. Hearing good.

The history of his injury is that he was knocked down by a cart in the street, and his head severely cut. He was carried to the London Hospital, where he remained some weeks. He had two attacks of erysipelas.

The case is complicated by the fact that he had had a slight trembling in his hand before the accident, and now has decided paralysis agitans, and during the last six months he has on one occasion lost himself in the street, being giddy and confused; and on another had a sort of fit. Prior to the accident he had good health, and his faculties are still perfect, excepting perhaps his memory.

He complains that on several occasions "he has heard beautiful music when there was none," and that often when he has seen objects, he continues to see them for long afterwards.

instances in proof of reflex inflammation and reflex loss of function; and the effect of injuries to the frontal branch of the fifth in inducing amaurosis, has often been quoted. Of late years, however, not a few surgeons have doubted the occurrence of this form of amaurosis.

CASE II.—*Neuralgic headaches of many years' duration and great severity—Paralysis of the ciliary muscle in both eyes—Dilatation of right Pupil with slight divergence of the globe—Slight diminution of sensibility in right forehead.*

Mrs. F—, aged 37, of dark complexion, from a village, near Lynn, Norfolk. She had good sight until about eighteen months ago, when she first noticed, whilst sewing, that often she could not see her needle or work. This increased, until during the last two months she has been unable either to read or work. Lately she has been troubled with double vision. She has now a slight external strabismus, the right eye looking outwards. I found that although quite unable to read large print (No. 14), she could see a distant board fairly, and I astonished her by giving her No. 14 glasses, with which she could, even read "minion," pretty easily. The pupil of her right eye was three times the size of the other, and very sluggish. There did not appear to be more difference in the power of vision between the eyes than this dilation of pupil accounted for. With a diaphragm and No. 12 convex; she could read minion with the right eye.

History of Headaches.—For six or seven years she has been liable to very severe attacks of headache and faceache. The headaches usually affected the forehead, sometimes on one side, sometimes the other; sometimes across the front, most severe on the right side. She describes the pain as having been very severe—shooting and darting, and as if her whole head was jumping. Sometimes the pain lasted night and day, but mostly it intermitted at night. She found great benefit by applying heat to the part. Whenever the pain "worked round to the back of the head or back of neck," she had sickness, but not otherwise. Often the pain would begin, not in the forehead, but in the face. During the pain her eyes would "flicker very much," and she often had severe darting pains behind the globes. She has had many teeth removed in the hope of curing the faceache. During the last six years she has scarcely ever been quite free from pain, always, even at the best, a sense of heaviness over her eyes, and never for many days without severe pain. She has not materially lost flesh. Menstruation always regular. Parents living and healthy. She herself has two children, the youngest 14. The headaches do not appear to have been connected with any uterine disorder. She was not aware of any numbness in the skin of the forehead or face; but on careful examination I felt no doubt that there was a slight diminution of sensibility in the right side, especially in the forehead. It did not, however, amount to much.

CASE III.—*Liability to frontal headaches—A nine days' attack of intense pain in right forehead, followed by blindness of right eye—No morbid condition of the eye itself—Diminution of sensibility in right side of face.*

Henry M., aged 36, a healthy ship-carpenter, came to the hospital, May 11, 1863, complaining that he had lost the sight in his right eye. The pupils were of equal and normal size, and moved with equal facility; neither being very active. Both dilated well with atropine, and, on ophthalmoscopic examination, I could not detect the slightest difference between the two eyes. In both, the media were perfectly clear, and the fundus generally was pale. The retinal arteries were rather small, and the choroids lighter in tint than usual. Both optic discs were surrounded by a very narrow margin of white.

Before using atropine, I had ascertained that he could only just count fingers with the right eye, and that he could not make out the letters of the largest type.

History, &c.—His statement was that a month ago he suffered from an attack of "most dreadful headache" in the right frontal region. The attack lasted for eight or nine days, almost continuously, and almost wholly prevented his sleep; as it subsided, his sight in the right eye failed. During the continuance of the pain he had now and then "catching or twitching in the eye," but the sight remained. The first failure of sight was on a Saturday, when a sort of fog was noticed; this fog increased up to the Tuesday, when the eye was utterly blind. It remained quite blind until the next Saturday, and has since then slowly improved. The attack of headache was not attended by the least sickness, and his appetite was throughout but little impaired. He has been accustomed to occasional headaches, chiefly frontal, all his life, but never had so severe a one as that which preceded the failure of sight. A few years ago he had several attacks of giddiness, but not recently. His father died of apoplexy, suddenly, at the age of 52.

He has lived comfortably, chiefly employed in yachting in summer, accustomed to drink moderately and to smoke moderately (never smoked much). Married, and healthy family. Often suffers from cold feet. He is a tall, rather spare man. His other eye remains perfect. He now sleeps well and eats well, but he has lost flesh a good deal lately, owing to his meat and beer having been restricted as a measure of treatment. He cannot hear well with his right ear "owing to having had discharge from it in boyhood." He fancied when touched with a feather that he could feel decidedly better on the left side of the face than on the right, but with the compasses no difference could be made out.

Tongue indented and pale, but rather furred, and tending to

dry in the middle. Pulse slow and full, 48 per minute. Never had fever, nor rheumatism, nor ague.

CASE IV.—*Severe toothache.—Attempted extraction of right bicuspid.—Subsequent paralysis of the right third and sixth nerves.—Paresis of sensation in right cheek, &c.—Paralysis of right sympathetic and of most branches of the fifth.—Ulceration in the anæsthetic nostril.—Pupil motionless, but neither dilated nor contracted.—Subsequent dilatation of the pupil, and healing of the ulcers in the nostril.*

Lydia Deller, aged 36, dark complexion, very pale and cachectic, was admitted at the Ophthalmic Hospital, October 12, 1862. She was still suffering from severe toothache. Three weeks ago an attempt was made to extract the right first bicuspid, and it was broken in. A few days after this she had great pain in the temple and back of globe, then the lid fell. She had seen double a day or two before the lid fell.

Present state (October 12).—Sensation seems perfect in the other side of the face and also in forehead of the affected side. She can bear touching of the eye on right side: it being all but insensible. The nostril is inflamed and ulcerated.

The pupils are of normal and equal size; the left moves well, but the right is motionless. When both are exposed to strong light, then the left contracts until considerably less than the right. With the feather of a pen I brushed off a film of mucus from the cornea, and she did not wink in the least.

October 23.—At the base of right ala of nose is an ulcer, and up the nostril, an inch within, a second ulcer. Sensation in cheek, side of nose, and conjunctiva quite lost. Pain much better.

November 3.—The ulcers in the nose are quite healed, and the pupil is widely dilated. No recovery of motor power in any of the muscles. Some improvement of sensation fancied in the cheek, but she can still bear a feather touching the cornea without the least winking. It is certain, however, that she has regained some sensation in the cheek, especially in the more distant parts from the lids. She can feel a little in the lids. The masseter and temporal of right side are decidedly more flabby than the others; they do act, but not with half the normal force.

December 1.—Since November 3, she has taken seven grains of iodide of potassium with half a drachm of tincture of bark, and with progressive improvement. She can now open that eye well and can move it in all directions considerably. Her power over the superior and inferior recti is much more than over the external and internal ones. Pupils of equal size, but the sight extremely sluggish. Feels much better in right cheek, and the muscles of mastication are much stronger.

CASE V.—*Blow on right side of face, following by periosteal thickening, and by paralysis of right sixth nerve.—Amaurosis with muscæ (symmetrical) eight years after the injury.*

John Cox, aged 52, a labourer, from the country, a tall, well-fleshed man; fairly coloured; formerly in the army, and in the Mauritius; never had ague.

Twelve years ago he had a severe blow on the outer side of face with an iron bar. There was no laceration excepting of the lip. A swelling rose "on the cheek bone as big as a walnut." After that his right eye turned in, and now the ext. rectus of that eye is paralysed. He can carry the right till it is directed straight forwards, but not towards outer canthus. Habitually the pupil is buried in inner canthus. He thinks that his sight has been always equal in the two eyes, and that it still is so. He can read No. 20 with either eye, but nothing smaller. He thinks that for a year past his sight has been as defective as it is now.

When the left is covered the right at once passes out till it is directed straight, and he can then see as well with it as the other.

He thinks that for three years his sight has been gradually failing. He first noticed that he saw numerous muscæ, "like a parcel of great flies hovering about." Then he began to have difficulty in reading. These slowly increased, and he has now for a year been quite unable to read. He thinks his memory is failing. He soon got well of the blow. No pain even in the globes, except some aching. Is very sleepy in the day. Was in very good health four years ago when the symptoms commenced.

August 4.—White atrophy of optic discs very marked, equal in degree. The larger retinal vessels are of fair size. Those of optic nerve proper, wholly absent.

CASE VI.—*Severe laceration of the left eyebrow.—Possible concussion of the eyeball itself.—Subsequent progressive loss of sight in the eye.—Partial anæsthesia of left cheek.—No morbid changes detected by the ophthalmoscope.*

Benjamin Brown, 52, a shipwright, a stout, healthy man, an out-patient under my care, at the London Hospital, in May, 1863.

Twelve weeks ago he was knocked down by a beam of timber; it struck him a most violent blow, throwing him 30 feet. He was insensible for a short time, and was taken to the Poplar Hospital, where he remained for a few days. Several teeth were knocked out of the left upper jaw, and a deep jagged laceration extended across the whole left eyebrow.

He came to me at the London Hospital, April 1863.

May 14.—There is a large scar in the left eyebrow. The globe looks a little sunken; pupils of equal size and normal. He says that he is gradually losing sight in the left eye. After the accident, as soon as the swelling had passed off, he found that he could not see quite so well in this eye as in the other, nor so well as he could before the accident; but he is sure that during the last two months it has got much worse.

With the right he can read No. 10 easily at long distance. With the left he cannot make out more than single letters of No. 20, and cannot see any letters on the distant board.

In the accident his right arm was fractured in two places, and this still prevents him from working.

He complains that his whole left cheek is numb, and marks out most accurately that the numbness extends to the middle of the upper lip. The anæsthesia is not complete, but he says he can feel very little, and that after he has rubbed it or nipped it for a while, it is as if stung with nettles, "tingling like." The anæsthesia seems greatest in the forehead, above the ear.

Ophthalmoscope.—The pupils are of equal and normal size, and both moderately active. Media in both eyes perfectly clear. Fundus in both normal, excepting possibly that the disc in the left is too abruptly margined, and rather paler than the other.

He is very deaf in the left ear, but can hear a watch close to it. He is quite certain that he could hear perfectly with it before. There is twitching of the left cheek, chiefly of the zygomatici and orbic. oculi. He cannot draw the mouth to the left ear. No anæsthesia of the chin on either side. The uvula deviates a little to the left side; it is not liable to spasms, but constantly hangs a little to the left.

CASE VII.—History of severe, one sided, frontal headache having preceded loss of sight in the left eye.—Failure of sight in right eye seven years later, again preceded by frontal headaches.—White atrophy of the optic nerves.

Philip C., admitted July 15, 1862.

Fair complexion, healthy-looking, moderately florid; married, five children; lives at Swindon; a carpenter, works in a brewery. About seven years ago he first noticed a sort of mist over his left eye. Ever since his sight has been gradually failing. He had at the time a very severe headache, chiefly across the left side of forehead. This headache lasted usually for about three hours a-day, "the morning part," and he suffered from it for three months; was under medical care, but kept at his work. He retained up to last summer, sight enough in the left eye to count his fingers, but now he cannot do so. Since the attack of headache described, he has frequently had slighter attacks, but none so

severe. This summer he has had the same kind of headache on the right side. He never before had much of it on the right side, always on the left. He never had ague; has several times had tic in the face. Sensation perfect over both sides of forehead and face. Appetite good; he smokes a little, but not much; moderate in beer, but he used to drink five or six pints a day. He found his headaches much better when he took less beer. For a time he had double vision. He now comes because he is anxious about the other eye; latterly, there has been a mist before it.

He is now blind with the left, can just discern light, but not count fingers. He can read with right, but not small print, and occasionally a mist comes over it. Nearly every day for more than a week (a fortnight ago) he had some headache over the sound eye. No loss of appetite, or sickness.

Media clear in both. *Left*—white atrophy of nerve itself advanced; small arteries almost absent; larger trunks not much diminished; veins larger than natural; fundus generally of deep orange-red; of deeper, more blood-stained appearance than the other. *Right*—white atrophy of nerve itself; but not nearly so advanced; fundus not so deep a red.

CASE VIII.—*Attacks of severe neuralgia always restricted to the left side of face.—Glaucoma of the left eye occurring during one of these attacks.*

Sarah Lee, aged 35, single, dark complexion; healthy now, but in childhood for fifteen years, had abscesses in the glands of the neck from ear to ear, of which the large scars remain. Both parents died aged. No history of phthisis in the family; "never could endure the sight of fat." Never had cough or other signs of phthisis. Is now thin, and has lost flesh considerably. A milliner; has used convex glasses for sixteen years.

History of Neuralgia.—Seven years ago, after a railway journey, she thought she had caught cold in her face, and had violent pains in the left lower jaw and side of face. The pain is described as having often come on very suddenly, and been very severe. It would pass off suddenly. Ever since then any slight cold, or other disturbance of health, would bring on the pain again. She has rarely passed a month without an attack, and has often had them daily for a fortnight together. The pain has been in the left cheek in the left malar bone and left forehead; never any pain whatever in the right side. She has never found the pain affect the teeth, and, indeed, never remembers to have had toothache. In the forehead, the pain has never passed higher than the frontal eminence. The pain never affected the eye itself. There was never any sickness attending the pains in the head, and she never considered them to be connected with disordered stomach.

The attack of Glaucoma.—Seven weeks ago, one day about noon, a violent pain in the left cheek commenced just as usual; it lasted all the afternoon, and towards evening began to affect the eye. This eye became inflamed, and she had severe pain in it throughout the night. The night following was better, as she thinks she soothed the eye by a warm poultice. The pain in the face continued severe for nearly a week, and then passed off. When she got rid of the neuralgia, the eye remained dull, and she saw “halos of light round the candle,” but there was little or no pain in the globe. For several weeks she had scarcely any pain either in the face or eye. Then the pain set in again; and for the fortnight preceding her application, although able to sleep well every night, she suffered excruciating pain during the day-time, in both face and eye.

State on admission.—Admitted at Hospital, May 7, 1863. All the usual signs of the glaucomatous state well marked in the left eye. The pupil fixed, much dilated; the cornea misty; the sclerotic dusky, and with veins of increased size; very decided hardness of globe. With the ophthalmoscope, cupping of the optic disc considerable; veins of retina turgid. I excised a considerable portion of iris in a direction upwards and outwards. The operation was performed under chloroform.

All her pain ceased after the operation; the cornea became again perfectly clear, and at the end of three days she could read large print. On May 14 (one week) she read No. 12 (great primer) with ease by candlelight.

At the present date, nearly five months after the operation, she remains well, and is able to read ordinary type quite easily.

CASE IX.—A florid, healthy young woman.—Amaurosis in one eye only.—History of long-continued neuralgia and of attacks of paralysis (temporary).—Ophthalmoscopic examination wanting.

In the following case symptoms of the most alarming character had presented themselves, and we have a good lesson as to the necessity of caution in giving a diagnosis of organic disease of the brain. The prominent feature of the case is the association of most severe neuralgia in recurrent attacks, with temporary paralysis of certain motor nerves and permanent blindness of one eye.

It will be observed that during the period of liability to headache she never materially lost her flesh.

The following notes are copied just as they were hurriedly taken at the time of the girl's admission:—

Mary M. N.—, æt. 20, single. Is blind of the right eye, and has been so for three years past. Liable to headaches of most violent character for about six months before she lost the eye. This pain was worst over the eyebrow, but affected other

parts of the head. She is accustomed to suffer from cold feet, and to dream frightful dreams. Catamenia regular and have always been so.

At two different occasions the mouth was drawn first to one side and then to another. It remained drawn some months. One of these attacks was before she lost the sight of her eye, and one since. Various remedies were adopted for the paralysis and different opinions were given. Some said she had a "tumour on the brain," others, "paralysis of nerves." Hearing always good. When her mouth was drawn she recollects that she had difficulty in speaking. When her mouth was drawn the one side of the body was weaker than the other. The headaches did not cease when the eye became blind. She had a seton in the neck, on Dr. —'s recommendation, over seven months. She had severe headaches afterwards, more severe than ever. Never lost flesh much. Her relations not liable to neuralgia or to paralysis. Mother died of phthisis.

M. M. N. is well grown, florid, and healthy looking.

She never had any pain in the eye. She states that one day in going up stairs she suddenly felt as if something went into the eye; it filled with water, and she found that she could not see.

She states that now she cannot see a lighted candle if brought close to her right eye.

The headaches have been much less frequent lately. She describes the pain as having been most excruciating during the attacks.

She usually lives at the sea side, but has often stayed for weeks in town for advice.

At the time the above notes were taken no paralysis was present, the loss of sight being the only symptom which had remained.

I have unfortunately not preserved the notes of the ophthalmoscopic examination, and can only speak from memory in stating that I believe the optic disc was found white and bloodless.

[To be concluded.]

TRAUMATIC PARALYSIS OF THE CIRCULAR FIBRES OF THE CILIARY MUSCLE (AND IRIS) OCCURRING IN A CASE OF HYPERMETROPIA ($\frac{1}{16}$), CORRECTED BY CONVEX GLASSES OR BY THE CALABAR BEAN.

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IN bringing before the profession the following case—one of the deepest physiological and pathological interest—I propose

to follow a plan, which however unusual will, I believe, prove more instructive, than that usually adopted. Instead of presenting the simple results of a long and labourious investigation, I intend analysing the case now, just as I did when I first saw it, displaying as it were, the successive steps, which gradually led me to a diagnosis, the accuracy of which I leave to the judgment of my readers.

Fanny B., æt. 28, presented herself at the Surrey Ophthalmic Hospital on August 20th, 1863. Eight days previously whilst opening a lemonade-bottle, the cork flew out and struck her on the left eye, causing her great pain and dimness of vision, which continued till she came to the Hospital. She was seen by the house-surgeon, Mr. Robt. Moon. He found the pupil dilated and fixed. She could read no less type than No. 16 (Jäger) and that but indistinctly. The fundus oculi was indistinct, as if from exudation.

R. Potass. Iodid. gr. ii.
ter die.

August 24th.—The pain has left her; she now reads No. 14.

Rep. Potass. Iodid. cum
Quin. disulph. gr. i. ter die.

September 1st.—From an observation the patient made, of the great improvement of vision that ensued when she looked through a pin-hole in a card, Mr. Moon was led to investigate the optical condition of her eye more closely than he had hitherto done, having previously taken the case rather for one of simple retinitis. It was then found that with the injured eye she read No. 22 indistinctly at 20 feet, but with the aid of a pin-hole aperture of about 1''' diameter she read it clearer, and that with a convex lens of 16 in. diameter she almost read 21.

September 3rd.—A still more complete investigation of the optical condition of both eyes was instituted. Her vision for distance was, as on the 1st, with + 10 she read No. 10 at 8'' well; no higher glass improved. The pupil was still dilated having a diameter of 2''; no evidence of any dislocation of the lens was there, either in a tremulous condition of the iris or in a direct objective examination. In this latter a new fact was elicited, that the direct image could be seen without the necessity of employing a concave eye-piece. The suspicion now for the first time arose, that some injury to the iris and ciliary muscle was the real nature of the case. But for the sake of simplicity I shall now group together the succeeding observations made on September 3rd by Mr. Moon, and these made by myself on the two following days, shall exhibit the results obtained in either eye parallelly in a tabular form:—

Right (sound) Eye.	Left (injured) Eye.
(1). Diameter of pupil = 2'''	(1.) Diameter of pupil in the same light = 3'''
(2). At 20 feet reads No. 18 well.	(2.) At 20 feet reads No. 22, not quite clearly.
(3). " " "	(3.) With an aperture of $\frac{1}{2}$ ''' diameter reads at 20 feet No. 20, with one of 1''' No. 21.
(4). " " "	(4.) With + 16 glass reads at 20 feet No. 18 well.

From observation (3) it was rendered probable that the dilatation of the pupil had some share in the diminution of visual power, and more especially as even an aperture of 1''' diameter enabled her to read a type lower than with the unaided eye, viz., No. 21. But observation (4) proved that some deficiency of refractive power in the eye had a far greater share in the loss of vision. I then determined to employ the Calabar bean paper, as, indeed, had been previously done by Mr. Moon, and shall now give the general results obtained by our two independent series of observations. In about 10 minutes the pupil was contracted to a diameter of about 1''' (a little larger); she now read at 20 feet No. 20, and with + 36 No. 19 well. No further improvement of vision ensued, although the pupil was at last only $\frac{1}{2}$ ''' in diameter. Observation (3) and this combined, therefore proved that the Calabar bean improved the patient's vision, not by its action on the pupil, but by that on the ciliary muscle. I now for the first time began to suspect the real nature of the case, viz., that it was one of a tolerably high degree of hypermetropia of both eyes, and that the defect of vision noticed in the left eye was due to a partial paralysis of the ciliary muscle, which prevented the patient correcting her hypermetropia by voluntary accommodation. But when I questioned her in this point of view, I found nothing whatever to corroborate this opinion, excepting an unusually distant near-point, viz., $3\frac{1}{2}$ inches of the right eye, and the fact that low convex glasses did not deteriorate vision for distance in this eye. Still my suspicion was so strong as to induce me to completely paralyse her power of accommodation in the sound eye by a strong gr. iv. solution of atropine, and then to test her vision with that eye. I then found that at 20 feet she could not read even No. 23; but that with + 16 glass she read No. 18, just as well as before any atropine had been applied. I then clenched the diagnosis by finding that in both fundi oculi the direct image could be admirably seen without the aid of any concave eye-piece.

The following details, although not bearing so strongly on the diagnosis, are not devoid of interest. No astigmatism was discoverable in either eye. Her near point with the injured eye was about 15 inches; with the aid of a 24-inch concave glass she read No. 4 at this distance. Before the accident she never perceived any difference of vision in the two eyes.

H. Müller, Van Reeken, and Rouget, have shown that the ciliary muscle, as the iris, consists of two sets of fibres, a circular and a radiating set. This case I consider to be one of a traumatic paralysis of the circular fibres of both these muscles, and would further seem to imply that the two sets of fibres are supplied by two different nerves. Pilz* speaking of paralysis of adjustment makes no mention of any traumatic case, but states that after paralysis of the N. oculi-motorius it is not complete, and that it is still doubtful whether tensor choroideæ is not supplied both by the sympathetic and by the oculi-motorius. My case seems to show that such is actually the fact, more especially when we remember that the researches of Valentin, Biffi, Budge, and Waller have proved that the fibres of the iris are supplied by two distinct sets of nerves; the radiating ones by the cervical sympathetic, the circular ones by the oculi-motorius. My case is almost the exact reverse of Professor von Graefe's celebrated case of traumatic irideremia with preservation of accommodation recorded by him at p. 150 of the 7th vol. of the *Archiv f. Ophth.*

A NEW OPHTHALMOSCOPE ON THE "GHOST" PRINCIPLE.

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My instrument consists of three parts.

- (1). A NON-perforated concave mirror.
- (2). A double convex lens of 2-3 inches focus.
- (3). A SHEET OF PLATE-GLASS.

The rays of light from a lamp are reflected by the mirror through the sheet of plate-glass on to the lens, and hence through the pupil of the observed eye to its fundus; they return through the pupil, strike the lens again, and produce an inverted real image near its focus; the rays of light again diverging, strike the sheet of plate-glass, and are hence reflected to the eye of the observer, who stands by the side of the patient's head. It will be thus seen that the real inverted image of the fundus oculi is reversed into a virtual laterally direct one. In this way the optic nerve vessels, &c., of the fundus can be readily observed.

* *Lehrbuch de Augenheilkunde*, p. 811.

